RAILROAD GAZETTE

FRIDAY, MAY 21, 1897.

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The Lighting of the New Burlington Trains.

The description of the new cars for the fast trains on the Chicago, Burlington & Quincy, between Chicago and Kansas City, printed in those columns last week, contained an error. The train is made up of Pullman sleeping cars, reclining-chair cars, dining and baggage cars, and has no electric lighting apparatus; but the entire lighting equipment is furnished by the Safety Car Heating and Lighting Company. In the glowing words of Mr. Eustis, the Burlington's General Passenger Agent: "The entire train is illuminated by a flood of soft white light from innumerable Pintsch burners."

Contributions.

Condition of Material in an Old Bridge.

PITTSBURGH, PA., May 12, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I note the proof of an article on the "Condition of the Material of an Old Bridge," reported by Mr. Ralph Modjeski. My own experience in bridge work is to the effect that the largest portion of crystalline eyebars is occasioned by the overheating of the bars in the operation of making the heads and the unequal strains produced in the metal due to the head portion being heated and the body of the bar cold.

This is especially noted at a point on the body of the bar at the location of the furnace door, unless afterward carefully annealed. All of this crystalline structure, unless the bars have been badly burned, can be overcome by careful and efficient annealing.

I am skeptical of the crystalline condition of the bars being occasioned by continual vibration and strain.

ALFRED E. HUNT.

Electric Conduit Roads.

NEW YORK, May 18, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Having read with interest the article by Mr. Nelson W. Perry in *Cassier's Magazine* for April, also your comments (April 30) on the article, and Mr. Perry's communication in the last number of the *Railroad Gazette*, I wish to write briefly concerning that part of Mr. Perry's article which refers to the Lenox avenue conduit road.

Being thoroughly familiar with the construction and operation of the Lenox avenue line, I must disagree with Mr. Perry's statements as far as they refer to the cost of operation of this conduit line.

Granting the necessarily greater first cost of the underground trolley and the inconvenience resulting from the tearing up of the streets while it is being installed, I still claim that after the underground trolley is properly installed it has advantages peculiar to itself which tend to make the cost of repairs for that part of the conduit construction which is comparable with the line construction in the overhead trolley, considerably less than it is for the average overhead trolley roads and at the same time I claim that the insulation can be made equal if not superior to that of the ordinary overhead trolley line.

Many disadvantages which are inseparable from the double overhead trolley system disappear when the the system is installed underground, while the insulation is better than in the overhead construction, as heavier and larger insulators can be used.

Concerning the matter of voltage employed, it is well-known that the Lenox avenue conduit road was the first one constructed in this country since the days of the Bentley-Knight experiment in Boston. Therefore, everything about the road, the low voltage included, was in a sense experimental. At the time the operation was begun on the Lenox avenue road, the construction of the Washington conduit road was about commencing. A voltage of 550 volts at the terminals was adopted there from the start and the road has been operated successfully from the first. The Lenox avenue road has gone through all conditions of weather peculiar to this latitude since the higher voltage has been used and it has proved very satisfactory in its operation.

You are correct in your statement that, at the 109th street terminus of the road, 2¾ miles from the station with 36 cars running, the drop is only 12½ per cent. and your statement, that on the two branches of the Lenox avenue line, 8¼ miles of single track, there is 77,600 ft. of 500,000 c. m. lead covered cable used, answers Mr. Perry's query as to the conditions as far as the copper is concerned. It is true that part of this cable has been put in use since Mr. Perry's data were obtained, but the copper per mile of track or per car is not excessive.

The leakage along the line has been measured time and again by ammeters at the station with no cars on the line and in all sorts of weather, and is but a fraction of 1 per cent. of the total output and as far as my observation goes, the losses from leakage do not exceed the losses on an ordinary overhead trolley line.

I must acknowledge to Mr. Perry my responsibility for your statement that the drop is 12.6 per cent. with 36 cars in operation, and that there have been but three failures of insulators since the new type of insulators was installed and that the leakage of current is hardly appreciable. I furnished the data for the above statements with the desire that the present facts—and not ancient history—regarding the underground trolley might be placed before the public.

The system is an expensive one to install, but there is no reason why it should be more expensive in operation than the overhead trolley, and as a matter of fact it is not.

The cost for power is no greater, the cost for line repairs is less, the other expenses remain the same, therefore the total cost for operation should be and is less than is the cost of operation of the overhead trolley. This is a fact susceptible of proof, and I would gladly show to Mr. Perry a statement of the cost of motive power of the underground conduit line for the last six months, which it might be of interest to compare with a similar statement from any overhead trolley line operating under similar conditions.

M. G. STARRETT.

Water Front Railroads for New York City.

The Board of Consulting Engineers to the Dock Board of the city of New York has made a further report to the Dock Department with regard to the improvements of the water fronts of New York City. This Board, it will be remembered, consists of Gen. William P. Craighill, Corps of Engineers, U. S. A. (retired), Mr. George S. Morison and Prof. William H. Burr. In the report now submitted the proposition is to establish a four-track railroad in the marginal way on the west side from Battery place northward to Christopher street, about two miles, which is to be extended still further north as conditions change and as the need arises; also to establish a similar four-track way from the Battery northward on the east side to Corlears Hook, about 1¾ miles. It is proposed that the two middle tracks of these roads should be kept clear for the prompt moving of cars. The two outside tracks would be used for standing cars to load and unload. From the track on the shore side spurs would be run to the piers and pier sheds as required, and from the track on the landward side spurs would be run into industrial and business establishments, as needed by the proprietors. It is said, however, by the Board that such spurs would not be required on the east side of the city.

The tracks on the west side would connect with the New York Central tracks, which already go down as far as Canal street. Connection would be made with other railroads by means of transfer boats or floats. In order to concentrate the connections and arrange for the occupation of the minimum amount of the water front by floats receiving and discharging cars, it is proposed that a float landing be made at the lower end of the west side line just above Castle Garden. Here an apron would be established adapted to a four-track transfer boat capable of carrying 40 cars. Above Fourteenth street tracks can be connected with the float landings of the Central Railroad of New Jersey, the Erie and the Pennsylvania already existing. On the east side a float landing can be provided near the Battery and a transfer boat landing (similar to that at Castle Garden) at the foot of Jackson street.

A further possible development of this plan would be building overhead bridges to keep pedestrians off the the street, and it is even suggested that it may be well in the future to build elevated tracks for the street passenger railroads. Neither one of these modifications, however, is essential to the main plan.

The Board presents a pretty elaborate argument setting forth the importance of changes that will cheapen and facilitate the means of handling freight on the water fronts of New York City, inasmuch as business is suffering seriously from lack of proper facilities for the interchange of freight between the railroads and the shippers. The present methods are not only inconvenient, but expensive, and better methods are found in rival ports.

Railroad Commissioners' Convention.

The ninth annual convention of State Railroad Commissioners was held in St. Louis May 11 and 12. About 50 gentlemen were present..

Mr. I. B. Brown, of Pennsylvania presided, and in opening the Convention, said, in part:

"It has been said that the life of commerce depends upon low rates of transportation. To those who still clamor for lower rates than those now existing, reasonable rate seems to be a synonym for lower rates, forgetting that there are two sides to be considered in arriving at what in equity can be denominated as reasonable. Congress, Legislatures, Boards of Trade, Boards of Commerce, and indeed shippers ought to be able to discover that a reasonable rate does not mean that commerce shall be transported at so low a rate as to result in loss to the common carrier and finally end in bankruptcy. In other words, a reasonable rate is one that will yield a just income for the service rendered by the carrier, taking into consideration necessary capitalization, expenses of operation and maintenance."

After the usual preliminaries the first business before the meeting was an address by President E. T. Jeffery, of the Denver & Rio Grande, a report of which will be found in another column. Following Mr. Jeffery, a paper was read by Mr. H. S. Abbott, a lawyer of Minneapolis, maintaining that Congress should exercise its exclusive power to regulate commerce. We give a report of this elsewhere.

In the afternoon of the first day the gentlemen attending the convention went to Alton, Ill., on a special train as the guests of the Burlington road.

Mr. M. S Decker, one of the secretaries read the report of the committee on uniform classification of freight, recommending that the convention urge Congress to pass the bill now pending in the Senate, which directs the Interstate Commerce Commission to establish a national classification, to go into effect next October. This recommendation was adopted unanimously.

Prof. Henry C. Adams, statistician of the Interstate Commerce Commission and Chairman of the Committee on Statistics read a report presenting a proposed classification of construction expenses, and also presented a scheme, in line with recommendations made by him in past years, for the establishment of a more comprehensive bureau of statistics and accounts, under the authority of the Interstate Commerce Commission. If such a bureau cannot be established under the existing law, Professor Adams recommends that additional legislation be asked for. He read at length from the report of the Interstate Commerce Commission two years ago, elaborating upon the difficulty of obtaining reliable figures from railroads in connection with investigations concerning violation of law. It was held to be the duty of the government to investors also to secure these results. The information contained in annual reports is often incomplete and misleading; in some cases the misrepresentations being deliberate, and in others due to the great diversity in forms of reports and methods of bookkeeping. Mr. Adams recommends the appointment of public railroad examiners who shall have access to the records and accounts of all railroads, the companies to be required to furnish annual and monthly reports which shall be filed with the Interstate Commerce Commission and certified to by all the examiners.

On the second day, Wednesday, Mr. E. P. Wilson, of Cincinnati, read a paper recommending that a convention be called, to be made up of such representatives as to thoroughly represent the public, for the purpose of conferring with a thoroughly representative body of transportation men, with a view to the formulation of harmonious propositions for amendments to the Interstate Commerce law. A motion being made to adopt this recommendation, Commissioner Becker, of Minnesota, objected, urging the convention not to commit itself to the Foraker bill now pending in Congress, which permits pooling by railroads. After considerable discussion the motion to adopt Mr. Wilson's recommendation was laid on the table by a vote of 31 to 3.

A resolution was offered providing that no person, except commissioners and railroad accounting officers, be entitled to vote in the convention, but it was defeated, a plea being put in that this would wrongfully exclude some of those present, such as the gentleman from Maryland, Mr. Bulkley, who appeared as the representative of the Governor of that state.

The committee on legislation made a report, presenting a resolution, which was unanimously adopted, urging Congress to promptly pass laws embodying the amendments to the Interstate Commerce law proposed in the last annual report of the Interstate Commerce Commission, and disapproving any modification of the Interstate Commerce law which would give the railroads additional privileges or exemptions, unless such modification be recommended by the Interstate Commerce Commission. Next after this subject came an informal testimony meeting regarding the working of railroad laws in the several states during the past year. A generally harmonious condition was reported by all the speakers, except that in California the enforcement of the Commission's order for an 8 per cent. reduction of freight rates on the Southern Pacific still hangs fire owing to delays in the Court.

A resolution offered by Mr. Mayfield, of Texas, endorsing the anti-scalping bill, now before Congress, was unanimously adopted.

The committee on "delays attendant upon enforcing

orders of railroad commissioners by procedure in the courts" was then read. It stated that circulars of inquiry had been sent to all railroad commissioners during the last year, and that they had experienced no difficulty in the Circuit or State Courts Some of them, however, complained of the length of time it took to get appealed cases through the United States Supreme Court, and the committee recommended that Congress be asked to make a law by which decisions of state courts in such cases should, when appealed to the United States Court, be advanced on the docket next to criminal cases.

The Commissioners present, according to the St. Louis *Globe-Democrat*, were:

California—H. M. La Rue.
Connecticut—George M. Woodruff, William O. Seymour, Alexander C. Robertson.
Illinois—Cicero J. Lindly, Chas. S. Rannels, Joseph E. Bidwell.
Iowa—Charles L. Davidson, George W. Perkins, E. A. Dawson.
Michigan—Sybrant Wesselius, Commissioner, and Wm. W. Wedemeyer, Deputy Commissioner.
Minnesota—Ira B. Mills, George L. Becker, Nathan Kingsley.
Mississippi—J. J. Evans, J. D. McInnis.
Missouri—James Cogwill, Joseph Flory and T. J. Hennessey.
New York—Ashley W. Cole.
North Carolina—D. H. Abbott.
Ohio—R. S. Kayler.
Pennsylvania—James W. Latta, Secretary Internal Affairs; Isaac B. Brown, Superintendent Bureau of Railways.
South Carolina—W. D. Evans, J. C. Wilborn, H. R. Thomas.
South Dakota—W. T. La Follette and Alex. Kilpatrick.
Texas—Allison Mayfield.
Vermont—Olin Merrill, Z. S. Stanton, Frank Kenfield.
Wisconsin—Chas. A. Coon, Deputy.
Interstate Commerce Commission—Edward A. Moseley, Secretary; M. S. Decker, Assistant Secretary, and H. C. Adams, Statistician.
Former Members of the Convention—H. D. Bulkley, of Maryland, and James H. Paddock, of Illinois.
Association of American Railway Accounting Officers—Erastus Young, E. S. Thomas, C. I. Sturgis, Cushman Quarrier and S. B. Schuyler.

The officers chosen for next year's convention are: Chairman, Charles L. Davidson, of Iowa; Vice-Chairman, H. M. Larue, of California; Secretary, Edward A. Moseley, of Washington, D. C. The next convention is to be held at Washington on May 10, 11 and 12, 1898. The convention passed a vote thanking the Missouri Commissioners for the handsome way in which those in attendance had been entertained, and then the Commissioners, with their wives, visited the Anheuser-Busch brewery.

Train Resistances.

In the April issue of the *Revue Générale des Chemins de fer*, there is an article by M. Barbier, the inspector of shops of the Northern Railroad of France, that throws some additional light upon the much-discussed question of train resistances at high speeds. In the opening paragraphs of his paper M. Barbier reviews the experiments made in 1882 by M. de Laboriette with the rolling stock of the Northern Railroad, in which dynamometer tests were made at speeds ranging from 15 to 33 miles an hour upon a straight and level track. The resistances there obtained are plotted graphically in the curve $a\ b$ of the diagram here reproduced in which the speeds are represented by the abscissas and the resistances R per ton by the ordinates. This curve was expressed mathematically by the equation

$$R = 1.45 + 0.0008\ V^2 \qquad (1)$$

for which M. de Laboriette substituted

$$R = 0.07\ V \qquad (2)$$

or rendering (1) into English equivalents, in which the value of R is given in pounds per ton of 2,000 lbs. and V the speed in miles per hour, we have

$$R = 2.88 + 0.0044\ V^2 \qquad (1)$$

and

$$R = .233\ V \qquad (2)$$

At this point it will be interesting to compare the deductions of previous investigators. The Clark formula, calculated by Mr. D. K. Clark from data obtained by experimenting upon English cars, and first published in his "Railway Machinery" nearly 40 years ago, is the most widely known and most generally accepted formula for train resistances; and so firmly has it established itself that it is used extensively to-day in the face of the improvements that have been made in cars and engines, and despite the fact that it has been repeatedly demonstrated to be too high. These formulas, says M. Barbier, were "deduced from experimental data, for the resistance of locomotives and trains, under these conditions: The permanent way in good order, the engine, tender and train in good order; a straight line of rails; fair weather and dry, clean rails, an average side wind of average strength, varying (in the experiments) from slight to very strong." For the resistance of engine, tender and train Clark gave

$$R = 8 + \frac{V^2}{171}$$

and for the train alone

$$R^1 = 6 + \frac{V^2}{240}$$

in which R = the total resistance of engine, tender and train in pounds per gross ton, and R^1 = the resistance of the train alone in pounds per ton, and V = the speed in miles per hour.

As shown in M. Barbier's diagram (which we reproduce in Fig. 1 with the metric terms translated into miles, tons and pounds), and as we have already noted, these formulæ give resistances much higher than the others under consideration. The improvements in rolling stock, and the fact that engines were continnally hauling heavier loads than would have been possible had Clark's formula been correct, led to the conclusion, first expressed, we believe, by M. de Laboriette, that the resistance of trains varied not with the square but directly as the speed.

In 1892 Mr. Sinclair took a number of indicator diagrams on an engine hauling the Empire State Express on the New York Central & Hudson River road at speeds running up to 78.9 miles an hour.

The editor of *Engineering News* made an elaborate analysis of these diagrams, computing the indicated horse-power and allowing arbitrarily 5 per cent. for the internal resistance of the engine, and at the conclusion gave as a formula for the resistance of that train

$$R = .24\ V + 2,$$

which for the sake of convenience was changed to

$$R = .25\ V + 2,$$

a formula which is very closely in accord with that of M. de Laboriette, but which is higher than those of the Baldwin Locomotive Works, and of the late Mr. D. L. Barnes, as shown by the diagram published on page 198 of our issue for March 19 of the current year, and herewith reproduced.

But as M. de Laboriette only carried on his experiments at the comparatively low speed of 33 miles an hour and less, and as he used only cars with a rigid wheel base, the officers of the Northern Railroad undertook to obtain the resistance, at very high speeds, of passenger cars, both of the ordinary type carried on four wheels and on bogie trucks. The trains of that road now run at 72 miles an hour on some down grades.

The work of securing the data given by M. Barbier, and which we here summarize, extended over a period of four years, from 1891 to the end of 1895, and was done upon a large number of trains both in regular and special service. The weight of these trains varied from 120 to 210 tons, exclusive of the engine and tender, averaging about 160 tons, which is equivalent to 15 four-wheeled cars. "The tests were conducted at all seasons of the year, in order that all of the conditions of regular service might be encountered; so that the resistances obtained may be regarded as representing average atmospheric conditions and an ordinary state of the track. Only those tractive resistances are considered that were

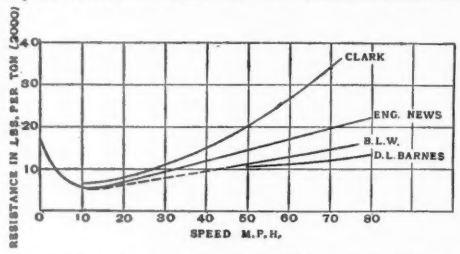

Fig. 2.—Train Resistances at Different Speeds.

obtained upon a straight track with a uniform profile and at speeds that were practically constant; this was done in order to remove every cause of uncertainty that might arise from allowances made for curvature and acceleration."

M. Barbier states that "the observations made at speeds less than 36 miles, and at from 69 to 72 miles an hour, were not numerous enough to warrant including them in the formula, which has therefore been determined for speeds coming within the limits of 36 and 69 miles an hour. The readings from the self-recording dynamometer enabled us to make a direct determination of the resistances upon the level without being called upon to make any correction at all for gravity.

"By representing the speeds by the abscissas, and the resistance per ton of train hauled by the ordinates, we obtain the curve $c\ d$, which very closely coincides with the parabolic equation

$$R = 1.6 + 0.023\ V + 0.00046\ V^2 \qquad (3)$$

in which R = kilograms per ton and V the speed in kilometers per hour. Transforming this to the English equivalents, we have

$$R = 3.2 + 0.077\ V + 0.0025\ V^2 \qquad (3)^1$$

"The constant 1.6 [in (3) or 3.2 in (3)[1]] represents the different fixed resistances of the cars, such as friction of the axles, the rolling resistance of the tires and the shocks whether periodical or accidental between the wheels and the rails. It is well known that, from a mechanical standpoint, these shocks occassion a certain loss of power and that from an acoustic point of view, they produce harmonic vibrations between the cars and the track whose frequency and amplitude determine the pitch and intensity of the resultant noise.

"The friction of the journals is the most important element of these fixed resistances, if we consider that the tires and the track are in good condition.

"The influence of speed upon the resistance is shown in the last two terms of the equation (3). R increases rapidly with V first on account of the action of the air upon the cars; it is in fact the preponderating factor in resistances at high speeds, and requires the introduction into the formula of a term of the second degree and secondly the side motion which the lateral reaction of the track imposes upon the cars, the importance of which varies with the modifications which the tractive effort sustains, other things being equal, according to the profile and consequently with the speed; so that the term of the first degree takes this element into account.

"No attention was paid in deducing formula (3) to the composition of the train, that is to say to the number, the arrangement and the total weight of the cars. Still, with the same weight hauled, the specific resistance falls slightly as the number of cars is increased; furthermore, if the bodies have a cross-section of the same form and dimensions, the value of R, per ton, is less than if the cars differ from each other and are grouped in a haphazard manner. These various considerations are of value in the case of freight trains, but for express passenger trains, where all of the cars have practically the same section, and where the number of cars of a given type is almost constant, for a fixed load, the influence of the composition of the train upon the resistance per ton is a negligible quantity. Furthermore, calculations and the experiments upon the Eastern Railway in 1880 have shown that on varying the load hauled, which i the main element in the composition of the train, the resistance per ton undergoes such slight modifications that the introduction of the weight of the train into the new formula would not be justified.

"For practical use the equation (3) can be transformed and changed into a simpler form as follows:

$$R = 1.6 + 0.46\ V\left(\frac{V + 50}{1{,}000}\right) \qquad (4)$$

or substituting English equivalents it becomes

$$R = 3.2 + 2.5\ V\left(\frac{V + 30.8}{1{,}000}\right) \qquad (4)^1$$

"A comparison of formulae (1) and (3) made within limits that are not too far apart go to show that for the

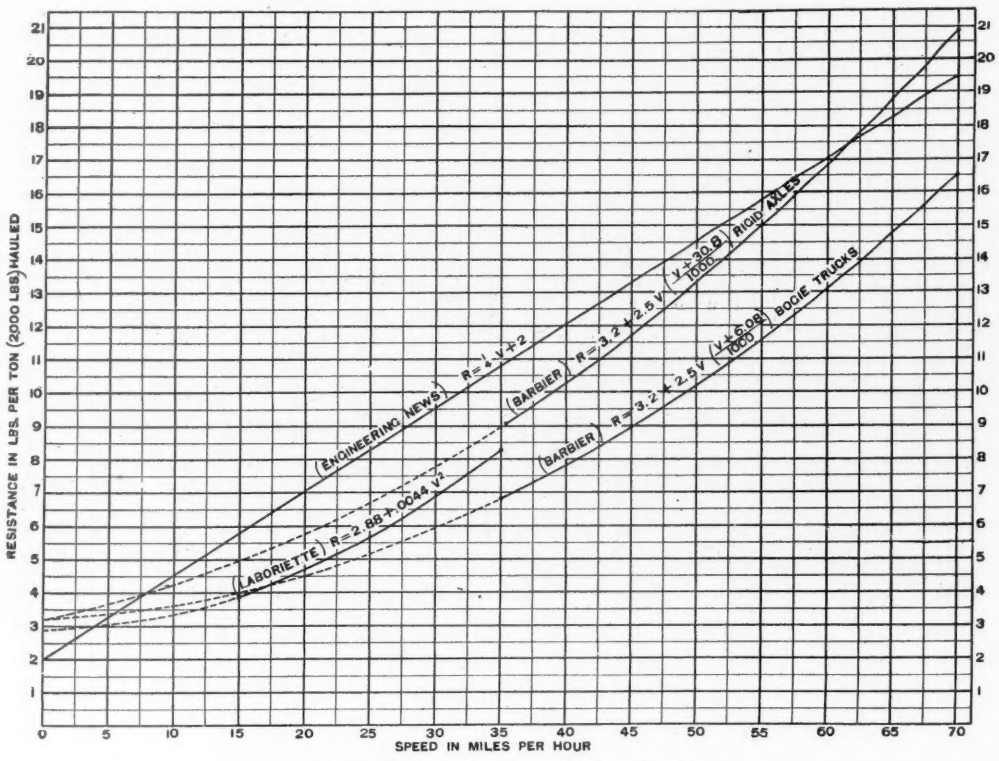
RESISTANCE IN LBS. PER TON (2000 LBS.) HAULED
SPEED IN MILES PER HOUR
(ENGINEERING NEWS) R = 2 + V + 2
(BARBIER) R = 3.2 + 2.5 V (V + 30.8 / 1000) RIGID AXLES
(BARBIER) R = 3.2 + 2.5 V (V + 50 / 1000) BOGIE TRUCKS
(LABORIETTE) R = 2.88 + .0044 V²

Fig. 1.—Train Resistances at Various Speeds.

same speeds the resistance per ton of freight trains is a little less than for passenger trains composed of four-wheeled cars.

"This anomaly is explained by the fact that, in the first place, the journals of freight cars are smaller than of passenger cars, so that, with the same diameter of wheels, the distance traveled by the journals is 29 per cent. greater in the case of the passenger cars.

"In the next place it is well to note that the length of the freight trains used by M. de Laboriette was more than twice as long as that of the passenger trains used in our recent experiments and that they were drop-bottom cars, presenting a very much smaller surface to the resistance of the air than the covered cars. It is for these reasons that we may expect to find the specific resistance to be less in freight than in passenger trains.

"*Resistance Upon Grades.*—To the resistance R upon the level, we must add, algebraically, that due to gravity upon grades, which is equal to the component of the load parallel to the inclination of the track. The value of this component is practically equal to the percentage of the inclination i, so that the theoretical resistance R^1 upon a grade may be expressed by $R^1 = R + i$, i being positive for an up and negative for a down grade.

"Direct observation, however, has shown that upon an up grade the total *actual* resistance R^1 is always less than this equation would give, while upon a down grade it is always more. This can only be explained upon the supposition that the weight does not enter into the total resistance for its whole value as indicated by the profile. It is, therefore, necessary to admit that the tractive power works under different conditions, according to the nature of the profile, as shown by the fall in the allowance to be made for gravity when passing, at a uniform speed, from a down grade upon a level and from a level to an adverse grade. Upon down grades the tractive power is less; the couplings are under less stress and the cars are moving more independently; the flanges of a greater number of wheels are rubbing against the rails, which perceptibly increases the resistance.

"Our observations, taken from a number of experiments, have led us to give a coefficient less than unity to i, which takes this side play and the shocks into account, and which we may consider to be, in round numbers, equal to 0.9, so that within the limit of grades of from — 0.5 to + 0.5 per cent. R^1 will be given by the equation

$$R^1 = R + 0.9\, i.$$

"R^1, then, is the resistance per ton hauled upon any grade whatever; R the resistance upon a level at the same speed; i the percentage of grade and is greater or less than 0 according as the grade is up or down.

In order to compare the actual resistance of cars upon four-wheeled bogies with the ordinary four-wheeled cars in use upon the Northern Railway, M. du Bousquet, the engineer of rolling stock and motive power, made some dynamometer experiments in June, 1895, with the cars owned by the International Sleeping Car Co.

"The trains were composed of sleeping-cars weighing 30 tons each, having a total weight, exclusive of the engine and tender of 206 tons, except in a single case, where it was 175 tons.

"Only those resistances were taken into account which were obtained upon a straight track with a uniform profile and a constant speed.

"The results of the observations, which came within the range of from 36 to 69 miles an hour, are plotted in the curve $e\,f$ of the diagram, which can be considered as a parabola; the speeds being given by the abscissas and the resistances by the ordinates.

"The equation for this curve, when put in the same shape for practical use as (4) is:

$$R = 1.6 + 0.456\, V\left(\frac{V + 10}{1000}\right) \qquad (5)$$

"Transposing this to the English equivalent we have

$$R = 3.2 + 2.5\, V\left(\frac{V + 6.08}{1000}\right)."$$

The following table gives the resistance, upon a level track, of cars fitted with the rigid and bogie trucks, the calculations for the latter being also made in accordance with the formula of the *Engineering News:*

Speed in miles per hour.	Resistance per 2,000 lbs.			
	Barbier formula.		Eng. News formula.	*Difference* between Barbier and Eng. News.
	Rigid Wheels, R_1	Bogie truck, R_2	Bogie truck, R_2	
	Lbs.	Lbs.	Lbs.	Lbs.
35	8.96	6.78	10.75	3.97
40	10.28	7.81	12.00	4 19
45	11.73	8.95	13.25	4.30
50	13.30	10 21	14.50	4.29
55	15.00	11.60	15.75	4.15
60	16 82	13.11	17.00	3 89
65	18.77	14.75	18.25	3 50
70	20.84	16.51	19.50	2.99

"An examination of the preceding figures, as well as the comparative diagrams, shows that the advantage possessed by the bogie is nil or negligable at low speeds, for the actual resistance of the cars, which is due for the most part to the friction of the axles, has practically the same value in both cases on account of the equality in the ratios of the diameter of the journals to that of the wheels. The difference between R_1 and R_2 increases with the speed, hence while at 35 miles an hour it is 2.18 lbs., at 70 miles it becomes 4.33 lbs. The principal cause of this superiority of the bogie rolling stock, at high speeds, depends upon the diminution of the number of spaces between the cars, so that the influence upon the whole train is very noticeably reduced. It must also be noted that the wheel base of the car being greater, the side motion is less and the movement is smoother than in the cars with a rigid wheel base.

"From the table we also see that the ratio of R_2 to R_1 varies from 0.76 to 0.79 between the speeds of 35 and 70 miles an hour. Hence the lowering of the specific resistance upon a level track by the use of the bogie truck amounts to at least 20 per cent."

In addition to the figures given by M. Barbier we have added a column calculated upon the formula prepared by *Engineering News*. This is somewhat higher than that of the one under review, at available speeds, but the two lines of the diagram gradually approach each other and would finally cross at a speed of 185 miles an hour. If, however, we compare this formula of M. Barbier with the line calculated from the formula of the Baldwin Locomotive Works in the diagram, reproduced in Fig. 2, we shall find that the two lines are very near together between the speeds of 50 and 70 miles an hour. At 50 miles the Barbier line is the lowest, at 60 it is barely in excess, and at 70 the excess is about 1½ lbs. per ton. As the formulæ for the two were worked out by independent investigators, and as each was ignorant of the work of the other, their close agreement should have great weight in the acceptance of the formula for the calculation of train resistances, and such difference as may exist between them may readily be explained on the basis of the difference in the construction of the cars with which the experiments were carried on.

M. Barbier adds that "in the report of the dynamometer tests of this kind made upon the state railroads a few years ago, M. Desdouits estimates a gain of from 25 to 30 per cent. in the use of bogie trucks," and concludes by asserting that the formulæ (4 and 5) given above can be considered as applicable to trains moving on a straight and level track between the limits of 36 and 69 miles an hour, and that the allowance for gravity of 0.9 i will also hold good upon grades between the same limits as we have already explained.

The paper must be considered as a most valuable contribution toward the solution of this vexed question, and its conclusions are based upon what is probably the most reliable body of data that has thus far been brought out.

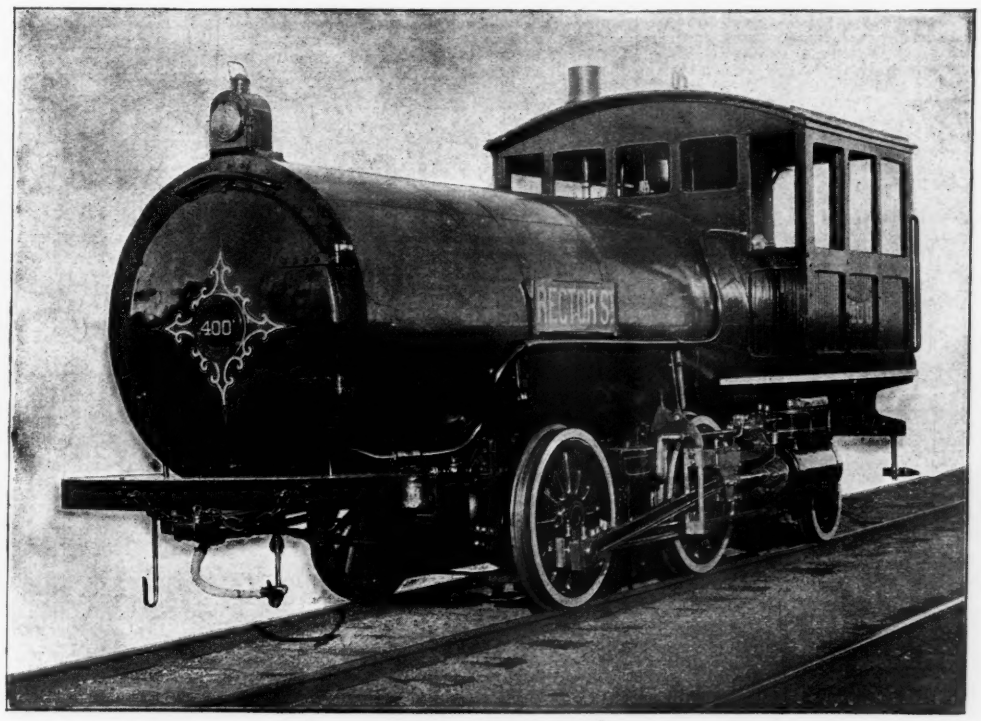

Fig. 1.—The Hardie Compressed Air Locomotive for the Manhattan Elevated Railroad, New York.

The Hardie Compressed Air Locomotive for the Manhattan Elevated Railroad.

The Hardie compressed air locomotive will soon be given a thorough trial on the Sixth Avenue line of the Manhattan Elevated Railroad, New York, between the Battery and Fifty-ninth street. A locomotive operated by means of compressed air and made in accordance with the plan worked out by Mr. Robert Hardie was run on the Second Avenue Elevated road in 1881. The air was stored in reservoirs at 600 lbs. per square inch, it being impossible at that time to obtain storage tanks that would be safe under a higher pressure. Although this was not regarded at the time as a crude machine, yet its inventor saw where it might be modified and improved, with the belief that it would ultimately supersede the steam locomotive for light service. To this end changes have been in progress with the result that a locomotive, shown by the accompanying illustrations, has been completed at Rome, N. Y., and its preliminary performance is very gratifying to the American Air Power Co., under whose supervision it has been built. The power station, at 100 Greenwich street, near Rector, has been completed for some time, and the reservoirs, connections and piping have been subjected to a pressure of 5,000 lbs. to the square inch. As soon as the locomotive arrives in New York it will first be given a preliminary test, after which it will take the place of one of the regular steam locomotives and be given an extended trial, running regularly during the hours of heavy traffic both morning and evening.

The same general principle of operation is followed in both the Hardie compressed air motors which are now in regular service on 125th street, New York, and in the new locomotive, the air being stored at a very high pressure, and after passing through a reducing valve is heated in a hot-water heater and then passes to the working cylinders, where it is used at a pressure from 150 to 200 lbs. per square inch. In the street car motors the water which warms the air is reheated by means of an injection of steam from the same boilers which are used to generate the steam for the compressors, and this water is heated at the same time that the storage tanks are being charged with air from the storage reservoirs. In the locomotive, however, the water will be heated by means of a small heater placed under the hot-water tank in the cab, shown in Figs. 2 and 3. This change is necessary inasmuch as the charging station is a considerable distance from the compressing station and because of the regulation forbidding a fire on the passenger cars. Besides

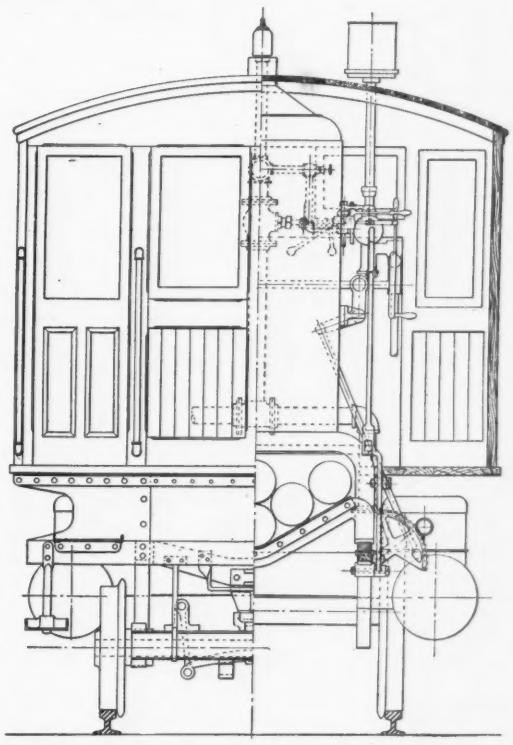

Fig. 3.—End Elevation and Section Through Cab.

this, they desire to be able to couple the compressed air locomotive to any train without altering the apparatus now in use.

The weight on the drivers is about 34,400 lbs., the total weight being 47,000 lbs., which is equal to the weight of the steam locomotives on the Sixth Avenue road. The Eames vacuum brakes now in use on the cars will be retained, the only difference in their operation being that air will be employed instead of steam for producing the vacuum. The capacity for water in the reheater is about 50 to 70 gals., and the passage of the air from the storage tank through this tank to the working cylinders may be followed from the drawings. The storage pressure in the Mannesmann reservoirs will be originally 2,400 lbs. per square inch, and it is estimated that the final pressure after the train has completed the round trip of about 11 miles will be from 300 to 400 lbs. Originally there were 37 of these reservoirs, as seen in Fig. 4, but in order to reduce the weight of the locomotive five were removed, making the total capacity now about 175 cu. ft. The engine cylinders are 13 × 20 in., and the driving wheels 42 in. The independent cut-off valve, shown in Fig. 3, was also a feature of the 1881 type, and may be regarded as one of the most novel devices used on the Hardie locomotive, and its operation is very simple. By revolving a small wheel located in the cab near the engineman, and which connects with the admission valve, the cut off may be varied from one-tenth to one-half stroke. There is also a "by-pass" valve which when open makes a direct connection between the low pressure receiver and the working cylinders, so that the locomotive may be started without altering the cut-off valve. This extra supply of air, which is not worked expansively, is admitted to the cylinder through the pipes that may be seen on the valve chest in Fig. 1. A short horizontal lever in the cab applies and releases the brakes when in certain positions, and by a slight advancing movement of this handle on the quadrant, the "by-pass" valve is opened, after which the engineman immediately opens the throttle and the locomotive starts easily, no matter what the position of the cut-off valve may be. By means of an attachment on the reducing valve the engineman can increase the pressure at starting for rapid acceleration by simply turning the lever—previously referred to—farer around on the quadrant, permitting an additional supply of air to pass into the cylinders, producing an extra pressure calculated to be about one-third more than the working pressure. As soon as the car is under way the handle is brought back to normal running position. The locomotive power-brake is not an Eames brake, but is one of special construction, so arranged that the same air which supplies the brake also releases it before escaping. These features are embodied in the street-car motors, and a detailed description of their operation, together with some theoretical considerations, will be found in the *Railroad Gazette* of May 29, 1896.

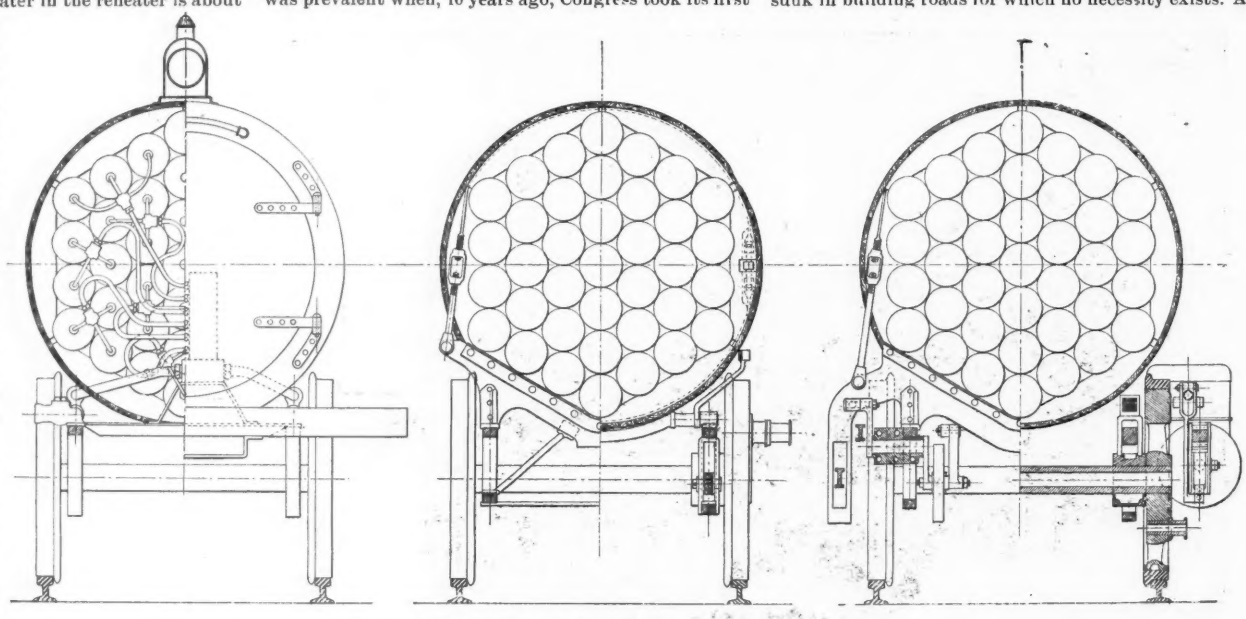

Fig 4.—Front, Center and Rear Sections Through Storage Tanks

E. B. Thomas on the Situation.

Mr. E. B. Thomas, President of the Erie Railroad, has written a long and interesting letter in the *Washington Post* (at the request of the editor of that newspaper), from which we make the following extracts:

There exists in the public mind an apprehension that the railways are opposed to the public interest, and that any legislation which restrains railways is of necessity for the good of the people at large. This impression was prevalent when, 10 years ago, Congress took its first step in dealing with the railway problem. Looking back for 20 years it is difficult to recall a single legislative measure, national or state, proposed, advocated or enacted for the benefit of the railways. Railways are not only the largest employers of labor direct, but they are enormous purchasers of supplies If the railway system of the United States were even fairly prosperous the amount of money it would annually distribute would exceed $1,200,000,000. The government disburses on an average about $400,000,000, or only one-third as much as our railways. The Erie, with a gross income of about $30,000,000 per annum, distributes in wages among about 39,000 employees over $16,000,000, and for material nearly $6,000,000, the greater part of which goes to the labor producing the manufactured articles. Taxes amount to over three per cent. of the company's gross revenue.

The total number of railroad employees in the United States is about 800,000 and the total expenditure is over $725,000,000. With five individuals to a family, there are 4,000,000 of people directly dependent upon the railroad industry, which thus distributes more actual money to a greater number of individuals than any other industry. The United States Post-Office Department is considered an important business, and yet the aggregate expenses of that department in 1895 were $90,544 322, while for repairs and renewals of locomotives, passenger and freight cars our railways expended in the same year $93,707,989. I only refer to these facts for the purpose of showing how intimately the successful conduct of these great properties is interwoven with other industries of the country, and how impossible it is to injure our railway properties without at the same time seriously injuring almost all other occupations and curtailing the prosperity of the entire nation.

Instead of benefitting the public, much of the so-called railway legislation has been a decided detriment. It creates uncertainty where certainty should exist. It breeds many of the ills (such as discrimination in rates) which it seeks to remedy, and has done much toward bringing bankruptcy and ruin to nearly half the railway mileage of the country. It throws a doubt over all railway enterprise, and makes securities speculative instead of sound and safe investments for the savings of the masses. In presenting these statements I am making no apologies for bad and reckless railway management, nor am I extenuating in the least the overbuilding and paralleling of railways, which, under the guise of competition and the conferring of benefits upon communities, have in many cases been little short of high-handed crimes. In many of the cases money which could have been better spent in improving existing roads, thereby enabling them to increase their facilities and reduce the cost of service to the public, has been sunk in building roads for which no necessity exists. As the country steadily progresses, however, there will be less of this, and a change from the methods of the legalized highwayman to the safer and sounder methods of good business. I believe that in no period of our railway history has there been a stronger endeavor on the part of the managers of railway properties to conduct them along conservative lines with a view of building up and developing the legitimate business of transportation.

Unlike most countries, we have allowed railroad enterprises to be projected practically at will and with no supervision as to whether the roads were needed or not. Is it surprising that under such conditions mistakes have been made and complications arisen that at times seem difficult to overcome? Yet the men responsible for the work have used their best judgment, given their best thought, and many of them the best years of their lives, in honest endeavor to make the most of the enterprise in which they have embarked.

Are not the purposes of this industry as necessary and legitimate, are not its owners entitled to as fair a return upon their investment as other industries? Are not its officers and employees as honest, efficient and patriotic as those in other avocations? Why not give them a fair chance? . . . They are often placed in trying positions. They see the property they are responsible for plundered by unscrupulous legislators, and they are hardly to blame for meeting these attacks by using all the means at their command to prevent the destruction of their property. In doing so the railway official is merely performing his duty to the security holders and to the public, who suffer when these properties become insolvent. In the main we can point with pride to achievements which, when compared with similar accomplishments in other countries, speak well for American enterprise, ingenuity and capacity for railroading. We have the cheapest freight rates in the world and when the fact that 99 per cent. of all Americans travel first class is considered, the cheapest passenger service. . . . Legislative demands have been made for air-brakes, auto-

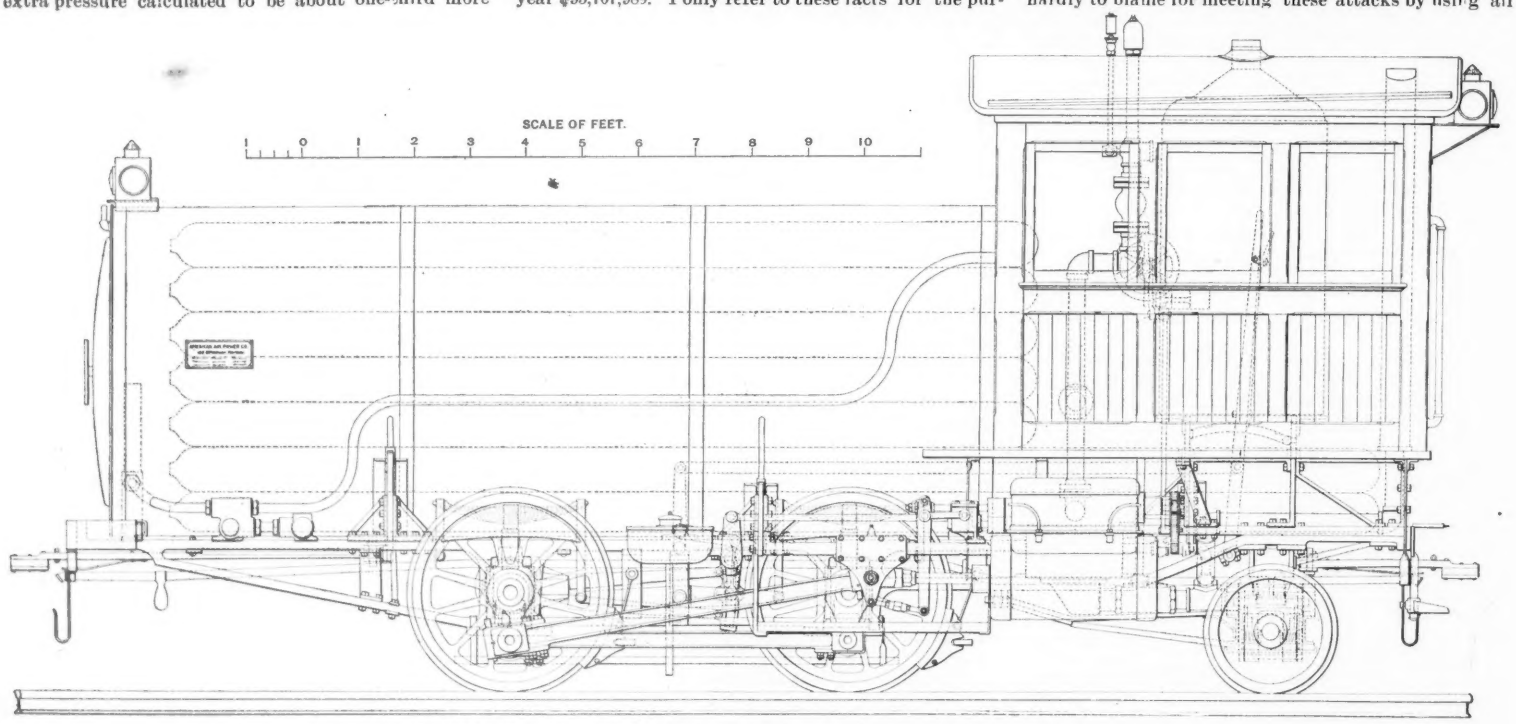

Fig. 2.—Side Elevation of the Hardie Locomotive, Showing Details of the Machinery.

matic couplers, steam heat, gas light, for lowering tracks and crossings, and a thousand and one things necessary and right, which should come in time, as population and business grow up to the railways, but which have been forced upon them irrespective of the fact that the steady demand for reduced rates has, together with depressed times, drained their resources to the utmost limit.

Though the present outlook is far from encouraging, and the recent decision of the Supreme Court declares that all attempts at uniform action are illegal, we seek for no legislation that will increase rates or add to the burden of the general public. The proposed pooling bill means at the best a sort of breakwater to prevent general demoralization. It is the best means thus far devised to legalize freedom of agreement between competing lines, so that all shippers may secure just, reasonable and uniform rates. Under it, when the rates are finally agreed upon by the competing roads and passed by the Interstate Commerce Commission as reasonable and just, power should be given to the roads to enforce them. This is a reasonable and fair demand, and one that Congress should at once grant

The proposition which has been suggested by some theorists for enlarging the Interstate Commerce Commission and permitting it to initiate rates would be a fatal mistake, and a system based upon such an idea vicious in the extreme. The railways not only have the ability but the facility to make rates. It is expert work, requiring judgment and a thorough knowledge of all local conditions. To have the rate-making power removed to Washington and absolutely fixed by a commission, no matter how able or how honest, would work incalculable injury. It would be far better for the government to purchase the railways and assume the whole responsibility than for the government practically to undertake the regulation and management of the property of private individuals. This is the most mischievous proposition thus far evoked.

While the legalizing of pooling will do much at the present moment to better the condition of the railroads, neither that nor any other legislation which can be enacted by any political body will prove a panacea for all the ills affecting it. Unrestricted building has created a transportation system beyond the ability of the present population to adequately support. Hasty, ill considered and harsh legislation has added its burdens. . . . The problem is a complex and delicate one, but its solution, approached from the standpoint of fairness on the part of the public and its representatives, and aided by the experience and tact of the railroad officials, is far from hopeless, and with time and experience must result in mutual understanding which cannot fail to benefit the whole country.

More now than ever before is there a great and serious responsibility resting upon every legislator, every public man, every one who is in any manner looked upon as leading and shaping public opinion.

Economy in Engine Oil.

At the April meeting of the New England Railroad Club the chief topic of discussion was "To What Extent is it Economy to Limit the Consumption of Oil per Engine Mile?" An abstract of the discussion follows:

Mr. COFFIN (Assistant Superintendent expert department Galena Oil Works): The subject is one concerning which much can be said, and I do not feel competent to handle it in a manner to give your club the necessary information in detail. There are many things to be considered before one can come to any definite conclusion as to what amount of oil per mile is actually required to lubricate perfectly locomotive machinery. Among them may be noted:

1st. The quality of journals and bearing metals used; also the weight carried per square inch of brass bearing.

2d. The design and quality of material used in eccentrics and straps.

3d. The quality of pins and rod brasses used.

4th. Quality of cylinder castings, rings, etc., used; also the tension at which they are applied to cylinders.

5th. The kind of sight feed lubricators and the condition in which they are kept.

6th. The kind of rod eccentric and guide cups used, and the condition in which they are kept.

7th. The quality of waste used in packing cellars and on the top of boxes.

8th. The kind of oil cans used and the condition they are kept in.

9th. The care and good judgment used on the part of the engineman.

Last, but not least, the quality of oils used has much to do in determining the question under consideration.

In addition to this, it will be necessary to also take into consideration whether the engines are in the hands of regular crews, or run by what in common parlance is known as the "chain gang." This, as may readily be inferred, is an important factor in determining the allowance of oils per mile run.

Where the mechanical conditions were reasonably correct, and fulfilled the conditions as set forth in the above requirements, the engines being handled by regular men, many tests which we have made, extending over a period of 12 months, on heavy, fast express engines, eight wheel, 18 × 24, have shown for the year 900 miles to one pint of cylinder oil and 60 miles to one pint of engine oil, including all oils used for packing purposes We have obtained about as good results from engines double-crewed. Examinations of cylinders, valves and seats were made before commencement of test, and at the end of 6 and 12 months respectively, at which time they showed a high polish on all the wearing parts, and were entirely without scratches. The wear was hardly perceptible, indicating conclusively that the danger line in the case had not been reached. It is only fair to say that this was an exceptional case, and cannot be used as a basis to limit the supply of oil, but will serve to demonstrate what can be accomplished with good oil and good machinery in the hands of a skillful, intelligent engineer.

However, inasmuch as all men running locomotives are not experts in the use of oil, we find it good practice to place limits within the reach of the average engineer, leaving the more intelligent men to develop as much better record as possible, consistent with good service. From our experience we can safely say that a limit on our average eight or ten-wheel American locomotives, with cylinders 17×24 to 19×24, of 250 to 308 miles to one pint of cylinder oil, and from 40 to 60 to one pint of engine oil, can be made. Freight engines, mogul or consolidation type, with 19×26-in. or 20×26-in. cylinders, can be run 150 miles to one pint of cylinder oil, and from 40 to 50 miles to one pint of engine oil. As a matter of fact, we have first-class railroads using our oils, which are making on the average for the year on all locomotives 180 to 200 miles to one pint of cylinder oil, and 50 to 60 miles to pint of engine oil. This, of course, you will understand, is the result of several years of experimenting, looking toward and securing the best modern appliances for feeding of oil; also the best journals and brasses, keeping the weight per square inch of bearing surface down to or not far in excess of the limit.

Another matter to be considered in the development of a good cylinder oil record is good feed water for boilers, water free from alkali and other objectionable qualities which naturally cause boilers to foam, and, therefore, washing of the film of oil from valves and cylinders

As I have endeavored to set forth, there are many things which enter into successful lubrication, all of which are important, but the most essential element of all is a satisfactory lubricant. That the oils manufactured by the Galena Oil Works, of Franklin, Pa., come up to the requirements of railroad lubrications in every possible particular, innumerable tests of the severest and most rigid kind have proven; and the fact that they are used on over 92 per cent. of the mileage of the United States, Canada and Mexico is a sufficient tribute to their merit

MR. A. GRIGGS: I do not believe that an engine whose cylinders are 18 or 20 in. in diameter will make 150 miles and find the cylinders in a satisfactory condition. A pint of oil should make 150 miles on an engine with 17 or 18 in. cylinders, especially on passenger trains, which I believe to be a good mileage, freight engines 100 miles to the pint. I have been on railroads over 40 years, and I have never seen so many cylinders bored out and new packing put in in all that time as I saw in 16 months of service with a Western road.

The cylinder is the place to go for oil; that should be the gage. When you take it away from there you take the power away from the engine and the tonnage hauled is less. It is surprising what power it takes to move the pistons when not properly oiled.

Mr. GEO. A. COOLIDGE: What differerence it would make in the higher boiler pressure of steam that is carried now over that carried some 10 or 12 years ago, I have had no experience. I am aware that some locomotives are running with nearly 200 lbs. as the limit. I should think you, Mr. President, could tell as well as anyone what difference, if any, that would make in the quantity of oil needed for cylinder lubrication. I know you have given the matter very careful attention, and it would be interesting to me to know the results obtained.

THE PRESIDENT: I am not prepared to offer any figures showing the additional oil necessary, but as a partial answer I may state, however, it takes a great deal more oil, and we are troubled more with cutting the valves and cylinders with a high pressure, especially when we get above 180 lbs. per square inch. That seems to be the danger line, not only with oil, but other matters. I think we can show that 118 or 190 is high enough for steam pressure. Above that we reach trouble in different directions.

MR. JAMES E. SAGUE.—I believe 180 to 190 lbs. is probably as high as it is economical to go on simple engines. I had a very interesting talk in Chicago recently with an officer of the Pennsylvania Railroad, and he spoke of 185 lbs. being about the limit, according to his experience, with simple locomotives. He said that the gain in economy by increasing the pressure from 180 to 200 lbs was only about one per cent., and that the trouble occasioned by the increase of pressure above 180 lbs. was more than sufficient to offset the gain in coal economy

In regard to saving oil, it seems to me that many railroad companies take undue trouble to save oil beyond a certain limit, while they probably do not exercise quite enough supervision over the coal pile. As I recollect it, the cost of coal on the average road is several times that of oil, and a saving of 10 or 20 per cent. in coal means a great deal more in total amount than a corresponding percentage of saving in oil. I think it is also to be held in mind carefully that saving in oil may be counterbalanced by some increase of wear in machinery, and some increase in liability to hot boxes. Careful experiments have shown that the utmost efficiency in lubrication is secured by the oil bath, and the lowest friction is obtained when a continuous stream of oil is supplied to the bearings, and if the oil is cut down beyond that point of free flow there is some increase in friction. Of course, I believe thoroughly that there is a limit beyond which oil is wasted in railroad service and it is necessary to find that limit, but it is poor economy to cut the oil down to such a point that there is danger of hot bearings or cut cylinders and valves.

Mr. DANIEL A. SMITH: The following is thought to be a good average performance by five engines on local passenger trains on B. & M. R. R., it being an average for the last four months of 1896:

Size of Cylinder.	Diam. of Drivers.		Miles run to pint of oil. V. oil.	E. oil.	All kinds.
17 × 22.....	69 in., with	lubricator,	188	59	39
16 × 22.....	69 in., without	"	119	62	39
17 × 24.....	66 in , with	"	127	65	42
17 × 24.....	69 in., without	"	130	57	40
17 × 24...	63 in., with	"	137	44	30

Also performance of two express passenger engines, weighing 125,000 lbs., on through trains, month of January, 1897:

Size of cylinder.	Diam. of drivers.	Miles run to pint of oil. V. oil.	E. oil.	All kinds.
19 × 24.....	72 in.	236	94	46
19 × 24.....	72 in.	109	68	32

Miles run to pint of all kinds of lubricants include car oil and grease.

It will be seen there is a wide difference in miles run to pint of oil by above engines, thus demonstrating the fact that a good careful engineman has everything to do with miles run to pint of oil, and and an engineman that is just a little careless in looking after his oil consumption can make a very poor showing without seeming to do so, and is full as liable to injure his engine and have detentions to train on account of hot boxes as the careful engineman using less oil.

Mr. D. A SMITH: I have taken off the best averages for 21 passenger engines, and from the sheet which has just been completed to-day I find that the average of those 21 engines was 155 miles to a pint. The engine oil was 63½ miles to a pint, and all kinds, including car oil and grease, was 43½ for the 21 engines.

The PRESIDENT: I will explain the methods in successful operation on the road with which I am connected [the Fitchburg].

At the commencement of a trip the engineman is given and charged with valve and engine oil equal to one pint of both kinds for every 15 miles of the contemplated run. He is expected to keep the engine well oiled, and to leave it in good condition for the next runner. At the end of the trip the cans are returned to the oil-room, where the exact amount of oil left over is noted and credit given the engineman on a sheet prepared for the purpose.

At the end of the month the total credits of each engineman are deducted faom the total charges and the result, on a mileage basis, shown on the engineman's engineman's monthly personal performance sheet. In this way we provoke a friendly rivalry which is productive of good results.

Without a doubt a large amount of oil is saved by removing the cans at the end of the trip, and not allowing them to go to the engine-house, where it often disappears very rapidly.

In a nutshell, my position is this:

Enginemen should be furnished good oil in quantities sufficient for proper lubrication, with a liberal margin for emergencies. Credit should be given on the engineman's personal account for all oil returned.

Relations of Railroads to the Public.

"The People and Their Railways" is the title of an address which was delivered at St. Louis, May 11, before the National Convention of Railroad Commissioners by Mr. E. T. Jeffery, President of the Denver & Rio Grande.

Mr. Jeffery began with a vivid historical sketch of the growth of railroads in America, the importance of this means of communication as an element in the marvelous growth in population and civilization in this country during the past 60 years, and the remarkable wisdom and energy with which the projectors of railroads have dealt with, and in the main, successfully solved, a tremendous problem.

Coming down to the present day and the problems now confronting railroad men and State Commissioners, Mr. Jeffery said:

"The plain and indisputable fact is that at prevailing rates and with the present volume of traffic our railways generally cannot be materially improved nor their facilities substantially increased out of earnings. The expenditures will in time be required, because improved fixed plant, higher speeds, heavier locomotives, larger freight cars and greater safety at highway crossings are growing necessities.

"The relentless wars of capital against capital have done much to bring about present conditions. A parallel railway is not built by demagogues, it is not constructed by hostile legislation, it is not conceived by boards of railway commissioners. It is deliberat ly planned and constructed by capital, and, for a time at least, is operated for the purpose of securing by fair means or foul a share of the traffic in the territory traversed. The breaking down of rates, and previously invested capital in such cases has been done by capital itself. This destructive work cannot be unloaded on legislative bodies and commissions and courts and nowspapers and demagogues. The responsibility rests upon capital. If a broader and more statesmanlike course is essential for the conservation, on just lines, of the interests we are deliberating upon, the reasonable protection of vested capital from the attacks of capital is necessary.

"Why ought new, unnecessary and parallel lines of transportation be permitted? Why ought the public to grant them charters? Why should any railway be allowed to come into existence unless it be shown before a lawful and duly constituted board that it is a public necessity? The public is better served between given points by one or two first-class lines than by several poor ones. Why should traffic be burdened with the additional fixed expenses of new and unnecessary railways?

"The relentless wars of capital against capital have been carried on in other ways. Old established lines with large local traffic have rivaled each other in rate reductions, secretly and openly. This action was not forced by legislative bodies, was not decided upon by courts, was not inaugurated by commissions, not put in force by demagogues. Secret as well as open contracts for traffic, and private rebates thereon were made and paid by the corporations themselves. The managers, the directors, the stockholders of these organizations performed these acts. They were corporate acts. It is no use to mince words regarding these things. It is no use to attempt to deceive the public mind. If stockholders objected to these procedures in the past they could have turned out their directors, dismissed their managers and put in control those who would not do these things. The plain truth is that these methods were used by those who thought themselves a little smarter than others of their class and who sought to obtain undue advantage over them. I do not criticise those who have acted in self-defense, but I do blame and denounce the aggressors. Railways that were honestly built have been reduced to narrow straits; public corporations should be curbed in folly and wrong-doing and sustained in wise and right doing, so that innocent and ignorant holders of their securities shall be protected.

Some Receivers have been foremost in paying secret and unlawful rebates, and in inaugurating so-called railway wars to the injury of the solvent carriers and without benefit to themselves.

Corporations, in spite of the attendant evils, are necessary. With the great enterprises now found necessary in all parts of the world concentration of money as well as of brains is absolutely essential. Large corporations must be regulated, and we have duly constituted commissioners and courts to carry out the will of the public.

"The stockholders, or partners, or co-operators, cannot object to having all possible safeguards thrown around the management of their affairs. If they are honest persons they will support the enforcement of honest methods, if wise they will welcome wise management, it candid they will honor candor even though it is enforced. If dependent for their daily bread on the income from their investment they will bless the power that protects them and procures a reasonable and reliable return. I am aware that in this I am going somewhat farther than most men are willing to go, but I aver that experience warrants the suggestion and entitles it to consideration.

"The fundamental principles of our national law are that all charges on interstate commerce shall be reasonable and just; that there shall be no unjust discriminations in favor of individuals, firms, corporations, cities or sections of country; that all charges shall be open to the public and shall have reasonable stability; that carriers shall not unjustly discriminate in interchange with connections; that dissimilar circumstances and conditions may justify a lesser charge for a longer than for a shorter haul and that the national commission shall pass upon alleged violations of these principles and pronounce judgment subject to appeal to the courts. The basic principle is that all charges for transportation must be reasonable and just. . . . Yet the Supreme Court has decided that carriers must not combine for the purpose of *maintaining* even reasonable and just charges. With our 700,000,000 tons of freight and 500,000,000 passengers annually, our innumerable routes, and our through bill-

ing and ticketing, all interstate charges must be reasonable and just, but the carriers must not agree between themselves to make and keep them so!"

After sketching the history of attempts at rate regulation, Mr. Jeffery said:

"The serious question of reasonable and just compensation for a carrier is to some extent obscured by the desire to have carriers act as nurses to sickly industries, unproductive farms and stagnant commerce, without much reference to some of these interests lacking strength and vitality to stand on merit and sustain themselves if they can on business principles, as the transportation companies must do. When trade is depressed the carriers are often expected to stimulate it; when manufacturers decrease it is supposed that carriers can broaden the field of consumption, and when farm products are low in market value the carrier is requested to reduce charges to the end that the farmer may receive better prices. The usual result has been that trade, manufacture and agriculture remain practically unchanged, unless improved under the unerring law of supply and demand, while the carrier becomes nearly or quite bankrupt by these well-meant philanthropic but futile efforts."

Speaking of railroad men's motives, Mr. Jeffery said:

"I am personally acquainted with many of the executives of our leading transportation companies and know beyond question or doubt that they have been for years and are to-day sincere and earnest in their efforts to accomplish what I have stated. The Interstate Commerce Law, after some hesitation, has been taken by them as a text; in support of it new associations were formed; to strengthen it new agreements were made; in pursuance of it tariffs were published; under it many public hearings have been had, and step by step the conservative, law-abiding and experienced railway managers have sought to weave a fabric of reasonable and just transportation charges throughout the Republic. As this work progressed they associated themselves still more closely for the objects of the law and to maintain the schedules of charges made in pursuance of it. They have declared themselves unequivocally committed to the basic principle of the law that all charges must be reasonable and just, and they have embodied this commitment in various agreements. At all times ready to respond to the summons of the national and state commissions and attend hearings and obtain rulings for or against them, the conservative carriers have sought to secure from commissions and courts a line of opinions that would mark with some precision the charges which, under different circumstances and conditions, might be regarded as reasonable and just."

Mr. Jeffery's principal recommendation in the way of a remedy for the existing difficulties was that railroad managers and state commissioners should have joint conferences for the purpose of agreeing upon what are reasonable rates and upon ways and means to make them stable. He disclaimed authority to speak for anyone but himself, but averred that he spoke from long experience, having been engaged in railroad work 40 years, "from apprentice boy in a machine shop to President; have at heart the public welfare, the legitimate and vital interests of labor, the desirable safeguards for invested capital, a love of fair dealing and justice, an abiding faith in the principles of our government and, moreover, I come to you from a state that at present entrusts its transportation interests to the common sense, fairness and integrity of its carriers, unrestrained by statutory provisions, but governed by common law. I feel deeply my responsibility to the public for the confidence reposed in me thus far as a railway manager, and I have always endeavored to consider in a dispassionate manner the commercial as well as the corporate aspect of the transportation question.

"The carriers are not fully agreed among themselves as to what ought to be done to perfect legislation in the mutual interest of the public and themselves, and perhaps the honorable commissioners are similarly conditioned. If duly appointed committees of representative railway men from the various sections of the country covered by the different traffic associations would meet and confer, they would, no doubt, reach a reasonable conclusion which could be entrusted to a sub committee empowered to ask for a conference with the federal commission in relation to interstate legislation, and with representatives of state boards as to state legislation if it be necessary in connection therewith. . . . Agreements between carriers for *maintaining* reasonable and just rates under the approval of the commissions, should be legalized, and when entered into, the people and the carriers who may be injured by violations of them should be able to sue and recover damages in courts of law; and perhaps the incorporation of joint traffic bureaus or associations or clearing-houses should be authorized, and persons who manage them be held directly responsible to commissions and amenable to law as recognized agents of carriers so associated together. Federal and state laws on the subject of transportation should be substantially alike. . . ."

European and American Street Railroads.

Mr. P. F. Sullivan, General Manager of the Lowell & Suburban Street Railroad Co., of Lowell, Mass., recently made a trip to Europe, visiting the United Kingdom, France and Germany for the purpose of obtaining information in regard to the street railroads in those countries. The result of his investigation is found in a pamphlet entitled "A Comparison of Street Railway Conditions and Methods in Europe and the United States." In this report he describes carefully the principles of fares, the management and control in the two typical cities, Glasgow and Berlin, and refers in a more general way to the present conditions of street railroads in Paris. In comparing American and European methods he endeavors to show: First, that the rates of fare in Europe are actually higher and not lower than the rates of fare in the United States; second, that the principle of charging a distance rate acts injuriously against the laboring and artisan classes, and, third, that under the conditions which exist in Europe with respect to high rates of fare, low rates of wages, the density of population, low mileage and low capital invested, and owing to the protection which the capital receives, street railroad investments are more desirable in Europe than street railroad investments in the United States. Going into details, he gives many comparative figures showing the population of American and European cities, together with miles of track in each and the population per track mile. We give below part of his report, showing the result of the investigation:

Street Railroads as an Investment.—Street railroads in Europe, in their relation to public accommodation, are about in the same condition as they were in the United States 20 years ago; therefore, there is need of improvement. To bring about improvement, however, will require a revolution in rates of fare, for in order to get people to and from the suburbs cheaply the fare must be brought within their income, but that cannot very well be done owing to the conditions which prevail. There is a very large population to be accommodated, and that fact insures good business; for it is safe to apply to European cities the same general principles as are applied to American cities, viz., that large cities are better than small ones, owing to a larger population.

Capital Invested.—Owing to prices of material, rate of wages and local conditions, it will require less capital to perform the same work in Europe than in the United States. For instance, Glasgow street railroads have invested $3.48 for each person in its population; Berlin, $5.25; Boston, $33.72. In the one item of cars alone to accommodate about the same population, Glasgow has $249,740, and Boston $5,510,544.66 invested. The interest on the capital invested in the cars of the West End Street Railway Company, of Boston, at 6 per cent. per annum, would be $330,632.68, an amount greater than the whole capital invested in street cars in the city of Glasgow. But it may be asserted that the West End Company is over-capitalized. That is hardly so, for among the 24 largest and leading street railroad companies of the United States the West End Company has the lowest capital invested per mile of track, while it is second in amount of track.

Rates of Wages.—The rates of wages are so low in Europe (although the rate of wages paid by the street railroad companies is higher than the general rate prevailing elsewhere) that the cost of operation is reduced to a minimum. The scale of wages in Glasgow, adopted in September, 1896, is higher than that in Berlin. Hostlers receive from $0.83 to $0.87 a day; laborers, $0 95 to $1; conductors and drivers, from $0.85 to $1.12—all per day of 10 hours' duty performed. The total receipts of the Glasgow Street Railway from all sources for the last fiscal year were $1,671,891; of Berlin, $3,890,201.50; while the amount of wages paid by the West End Company was $3,842,230, without taking into account wages paid to contractors for track renewal, etc., an amount nearly equal to the total Berlin receipts and more than twice the total Glasgow receipts. If the West End Company, therefore, paid the same rate of wages as is paid in Europe, it could afford to pay $2,000,000 per annum for its franchises and still maintain its dividends.

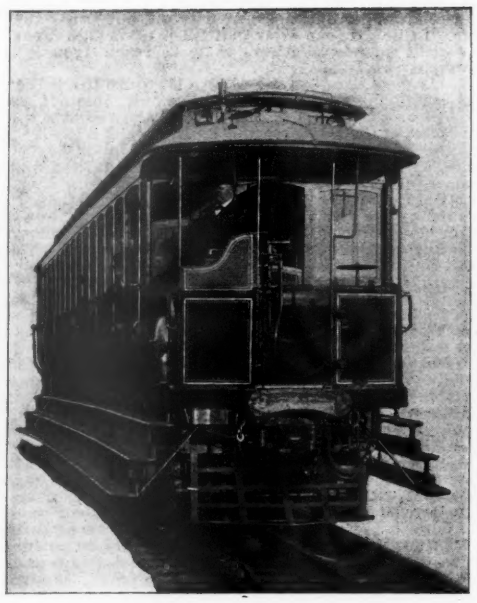

Fig. 2.—Motor Car for the Hartford-New Britain Third Rail Electric Road.

Protection to Capital.—The street railroads of the United Kingdom are constructed and operated under the General Parliamentary Act of 1870. That act in practically its present form has been the basis upon which all contracts and franchises were made and granted. Those who invested their capital, therefore, knew with reasonable certainty what the conditions would be with respect to legislation during the existence of the contracts. Inasmuch as petitioners are compelled to pay all parliamentary expenses, which usually reach the sum of about $20,000, there are very few changes in local affairs. The same situation with respect to changes exists in Germany. The financial departments of municipal governments are skilled in all matters relating to finances, so that when the government and those seeking a franchise meet, both parties are fully informed, and the result is usually satisfactory to both parties. After contracts are signed there is no disturbance. How different in the States! Capital is invited to embark in an enterprise, the public is enthusiastic in its applause and in a very few years the same public is clamorous against the particular investment which it fostered and encouraged.

Taxes.—Street railroads in Europe pay no taxes upon the capital invested in tracks. In Massachusetts, in addition to paying the local tax, they pay a tax into the State Treasury upon the net capital invested, and said net capital is represented by all items of investment. Glasgow paid in the last fiscal year for all taxes $23,072, and the West End Company $338,996.

Municipal Ownership.—A few words regarding municipal ownership and operation of street railroads may not be out of place here. The impression intended to be conveyed by its advocates is that there is a universal demand for such a change in Europe, but the facts do not warrant any such conclusion. It is true that ways and means are discussed at present with a view of adopting policies at the expiration of present contracts. All the street railroads in the United Kingdom were constructed and are operated under the general act of 1870, and as all contracts were made for periods not less than 20 years, they have expired or are about to expire within a few years. Glasgow has acquired it own plant and London is attempting to purchase the rights and property of a few small companies. In London, however, the acquisition is not for the purpose of operating the railroads, but in order that contracts may be made which will remove the objections to the present unsatisfactory service.

Huddersfield and Leeds are referred to as cities which own and successfully operate their own plants. Huddersfield is a city of nearly 100,000 population and 20 miles of track, an average of 5,000 persons per mile greater than the average of any city in the United States. The city acquired the street railroad property in 1891, and up to 1896 it has just about paid the interest at less than 3 per cent. on the investment since the acquisition. In one year a tax of 2½ per cent. was added to the general tax to help pay the deficiency of the street railway department. Leeds has a population of 368,000 and acquired the ownership of the tracks of the street railway company in 1894. It is too early yet to look for results, but we shall hope that the municipality will succeed better than the late stockholders, who lost $392,095 out of an investment of $80.),000.

Birmingham, one of the most progressive and best governed cities in the world, with a population of nearly 500,000, does not take kindly to municipal ownership and control. At a meeting of the City Council of that city, held July 7, 1896, after a very full discussion upon the report of the Public Works Committee, it was voted to extend the present lease for a period of 21 years to a syndicate represented by gentlemen, one from Toronto and one from Montreal. The following quotation comes nearest to expressing the business sentiment of England: "That the opinion of competent judges is that the lines, etc., should rest in the local authority, but the working be left to private enterprise, and that this would be a just settlement of the question."

The Third Rail Electric Road in Connecticut.

In our last issue we gave briefly a description of the third rail electric road which will soon be opened for regular service between Berlin and Hartford via New Britain. The road between Berlin and New Britain on the New York, New Haven & Hartford is single-track, and from New Britain to Hartford only the eastbound track of the New England road has been fitted up to be operated by electricity. The total length thus changed is 12.3 miles, which makes the longest section of any railroad previously operated exclusively by steam locomotives to be run by electric power. Since the official test, made on Monday of last week, active preparations have been in progress to open the road for public service between Hartford and New Britain. Turnouts have been provided so that cars can run from New Britain to Hartford every 20 minutes. The fare each way on the electric cars will be 10 cents, the present fare by the steam cars being 25 cents.

The power station, located at Berlin, is a brick and stone building, and divided by a central wall into a boiler-room and an engine-room. The present length of the building is 113 ft., its depth, exclusive of the bay in which is located the switchboard, is 102½ ft., and the height to the rigid pole, 65 ft. One end of the building is not bricked in, so that an addition to the present structure can be added when required. In the engine-room there is at present a Greene-Corliss, cross-compound, condensing engine, built by the Providence Steam Engine Co., and rated at 1,200 H. P. (nominal), with steam cylinders 28 and 48 in. in diameter by 4 ft. stroke. The fly-wheel makes about 100 revolutions a minute. To the engines is directly connected a General Electric standard 10 pole 350 KW. generator of the ironclad type. The dynamos are over compounded and furnish current at 600 volts no load and 650 volts full load. The shaft and armature weigh 58 tons, and the fly-wheel, which is cast in four sections, and is 18 ft. in diameter, weighs 52 tons, making a total weight on the bearings of 110 tons. Fig. 1 shows the generator and fly-wheels. A traveler with two cranes, one of 35 tons, the other of 5 tons capacity, runs the entire length of the engine-room. It was built by the Berlin Iron Bridge Company, which also furnished the steel roof trusses.

In the boiler-room there are at present five return tubular, horizontal, steel boilers, of 300 H. P. each, built by E. Kendall & Sons, of Cambridgeport, Mass. Five additional boilers of the same capacity each and of similar construction as those now in place are being put in position, which will furnish power for the engines and generator which are now being installed in the engine-room. In the construction of the boiler front a new method devised by Colonel Heft has been followed. The entire front of each boiler can be taken down without disturbing the boiler setting, the front being bolted to a plate attached to the dividing wall instead of to the wall itself. The fuel used is what is known as locomotive sparks, and the burning of these cinders under a forced draught in the power stations at Stamford and Nantasket Beach has given considerable satisfaction. Many tests covering a considerable period of time were made to determine the best method of firing the boilers with this fuel, and because of the good results thus far obtained, the engineers of the road have been led to believe that a large saving in the motive power item of the operating expenses will result from its use.

There are two feed water pumps, either of which being capable of supplying water to both batteries at once. The piping from the boilers is in duplicate and will be covered with non-conductive covering. The flues enter a brick stack 125 ft. high, located immediately in the rear of the center of the present building.

Four cables, each of 850,000 circular mils capacity, connect the switchboard with the third rail, which is similar to the rail used between East Weymouth and Nantasket Junction on the South Shore Branch of the Plymouth Division of the New York, New Haven & Hartford and illustrated in our issue of July 3, 1896. In cross-section the rail resembles a flattened A and weighs

93 lbs. to the yard. It is laid upon blocks of wood, which first receive an application of creosote, after which they are boiled in tar. The blocks are about one-half as high as those used at East Weymouth, allowing 1⅝ in.

The entire installation has been under the direction of Col. N. H. Heft, of the New York, New Haven & Hartford, and Mr. Edward C. Boynton has had direct supervision of the work at the power station. We are indebted to the General Electric Company for the photographs from which the accompanying engravings were made.

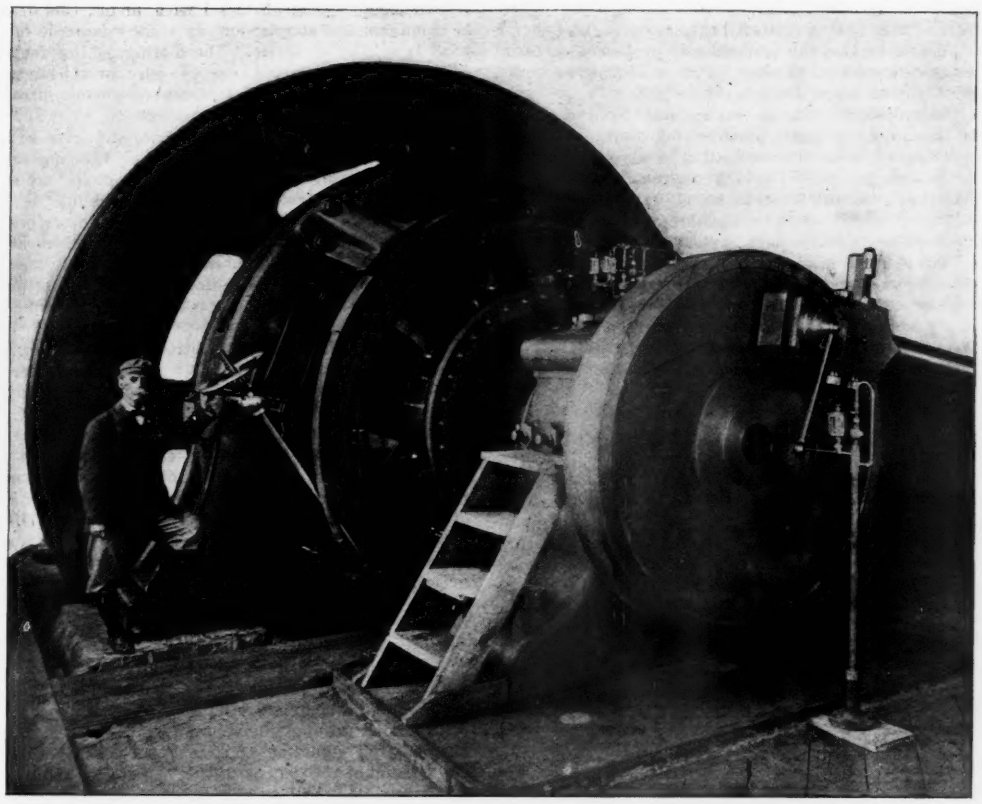

Fig. 1.—The G. E. 1,200-H. P. Generator at the Berlin Power Station of the New York, New Haven & Hartford.

from the eave of the third rail to the tie, and in some places but 1½ in. The top of the third rail is about 1 in. higher than the level of the tops of the running rails. This third rail is made of conductor rails which are bonded by plates of sheet copper ⅛ in. thick, 12 in. long and 4½ in. wide. These are fastened to the underside of the third rail joints by means of a drop-forged iron angle-plate by 16 bolts, 8 for each copper plate, on each side to the third rail joint. Each bond has a capacity of about 900,000 circular mils, the bond at the joints having about twice the carrying capacity of the rail itself, while its measured resistance is less than an equal length of the 93-lb. third rail.

Contact is made with the third rail by means of cast-iron sliding shoes which are each 12 in. long, and 4 in. wide and weigh about 20 lbs. They are suspended by two links from a casting fastened to a beam placed directly beneath the king pin of each truck, connection between motor and shoes being made by flexible cables. The distance between the two shoes is about 33 ft. Many of the grade crossings are wider than this and to avoid the necessity of carrying trains over the crossing by momentum another shoe is fitted to each truck of the second car of the train, a connection running from these shoes to the motors. Thus, by the time the last shoe has left the third rail at one end the first shoe is in contact with the next section of the rail.

On the Berlin branch are four grade crossings; on the New Britain & Hartford line 18. The third rail is not carried over any of these crossings, the circuit being continued underground by stranded bare copper cables from 500,000 to 850,000 circular mils. These cables are first drawn into creosoted wooden conduits filled with an insulating material made of residuum and asphalt. They are then laid in creosoted wooden troughs in turn filled with the same compound and then boxed over and buried. The broken ends of the third rail are fitted with wooden inclines or approach blocks to allow the shoe to rise upon the rail without danger of catching and breaking.

At Berlin and Hartford stations, the third rail section is fenced in on both sides. At New Britain, where the lines of the New Haven and New England roads converge, in addition to the fence an additional safeguard has been adopted. In the Y formed at the convergence of the roads is the switchman's tower. From the section of the rail entering the station, cables run underground to a switchboard in the tower, by which the third rail may be connected to or disconnected from the circuit. As the train comes to a stop in the station, the third rail is cut-out, and is not thrown into circuit again until the outgoing train is ready to start.

The open cars weigh about 32 tons each, are 50 ft. long and are fitted with two G. E. 2,000 motors, weighing 4,300 lbs. each, two L series parallel controllers and two automatic circuit breakers. The cars are lighted by 16-c. p. lamps. At present five open cars, similar to the one shown in Fig. 2, are ready for service. Air for the brakes and whistle is supplied by a vertical double-cylinder air pump driven by a motor automatically controlled by a special switch, which is opened when the pressure in the main tanks reaches 90 lbs., and closed when it falls below that amount.

Congress Should Regulate All Our Commerce.*

The magnitude of the transportation problem and the difficulty of its solution impresses every one who has given the subject serious consideration from the standpoint of practical work. Every legislative body in the country has attempted to prescribe such rules, various, dissimilar and often incongruous in scope and character.

What can be accomplished by legislation? The causes producing unjust discrimination will be found to consist of economic laws and conditions and the selfishness of human nature. Economic laws based upon natural conditions cannot be changed or modified by legislation. The United States is a commercial empire vast in area, with climatic conditions widely different in character, yielding diversified products and including trade conditions, trade classes and trade localities, each intent on the upbuilding and financial prosperity of its own interest and section regardless of the rights of others. . . . Statutory enactment is scarcely a feasible method for reforming human nature.

If the problem is to be dealt with effectively it must be treated not as a local question but from a national standpoint, in a statesmanlike manner and by men whose horizon is broader than a single city or village. To illustrate, it is a sound principle and one generally recognized, that so long as a rate is not unreasonably high, the end to be sought is the stability of the rate, rather than its relative cheapness; that a moderate, stable, uniform rate is far preferable to fluctuating rates, for commercial affairs require unvarying conditions. And it is a strange fact, that to the present time framers of railway legislation seem to have concentrated all their energies on the effort to maintain unlimited free competition, as if by legislation of this character stability of rates could be best secured and maintained. Again, one form of discrimination has been the issuance of passes. Until public officers refrain from using their official positions to levy blackmail of this kind and legislative bodies cease enacting laws prohibiting the issuance of free transportation to all except themselves, this question should be considered from a moral standpoint, not a legislative. Legislation should be directed against the taking as well as the giving of passes; and this is true in regard to unjust discrimination against persons, arising from secret rebates, under billing and other devices of this kind. This discrimination is largely the result of efforts made by the shipper.

What is the character of present legislation? The people of the United States have a duplex form of government; State and National. The National has plenary power over commerce among the States, and the several States have police powers confined to the boundaries of each. Forty-eight different communities, each, without consulting the others, attempting to solve and regulate a National question. Nearly all of these states have organized railroad commissions, and the character and extent of their powers and duties vary widely; in some states their sole duty is to hear complaints and investigate charges, in others they are invested with authority much more extensive.

The transportation legislation of this country has been based too much upon the theory that the management, of interests representing nearly 25 per cent. of the wealth of the United States was engaged in an oppressive business, the presumption being that their motives at all times were selfishly dishonest. Legislation has been too much, possibly, in the interest of classes other than the investor. Legislation to be just must not damage or destroy one interest to aid or upbuild another.

Future legislation should be uniform and not class. The interests of both shipper and investor should have equal weight. It should be general. The less the state takes into its own hands of the active management of the transportation business the better it will be for both parties, for when two parties hostile in interest attempt to manage a business jointly, the attempt must inevitably end in the wrecking of the business. Active rate-making is a part, though a small one, of the business of transportation. Legislation to be effective must be elastic and statutory; detail regulation can never be changed quickly to meet sudden contingencies or emergencies or altered commercial conditions.

The Supreme Court has firmly established two principles for the guidance of the future legislator. In the "Granger cases" it held that when the owner of property devotes it to a use in which the public has an interest, he in effect grants to the public an interest in such use and must to the extent of that interest submit to be controlled by the public for the common good. That when property becomes "affected with a public interest" it is subject to the regulation of the state.

The other principle is that the power to regulate is not the power to confiscate, is not the power to destroy. This was first held in Stone vs. Trust Co., 116 U. S., 307, and has been reaffirmed repeatedly since, the latest decision being that of Reagan vs. Trust Co., 154 U. S., 362-399, where the Court in the opinion, written by Justice Brewer, says: "It is within the scope of judicial power and a part of judicial duty to restrain anything, which in the form of a regulation of rates operates to deny to the owners of property invested in the business of transportation that equal protection which is the constitutional right of all owners for their property." It would be idle waste of effort to attempt legislation not falling within this rule.

As a last suggestion, in what legislative body should railway legislation and regulation originate? The power was given Congress in the constitution "to regulate commerce with foreign nations and among the several states and with Indian tribes," and "to make all laws which shall be necessary and proper for carrying into execution the foregoing powers." In this connection it is an interesting and suggestive fact, according to Webster, "that the entire purpose, for which the delegates assembled at Annapolis, was to devise means for the uniform regulation of trade. They found no way but in a general government . . . and over whatever other interests of the country this government may diffuse its benefits and its blessings it will always be true as a matter of historical fact, that it had its origin in the necessities of commerce and for its immediate object the relief of those necessities, by removing their causes and by establishing a uniform and steady system," and Chief Justice Marshall says, "The power over commerce including navigation was one of the primary objects for which the people of America adopted their government."

The term "to regulate commerce" is one of the broadest significance and requiring the most liberal interpretation. It was familiar to the founders of the nation, who, with their own disastrous experience vividly be-

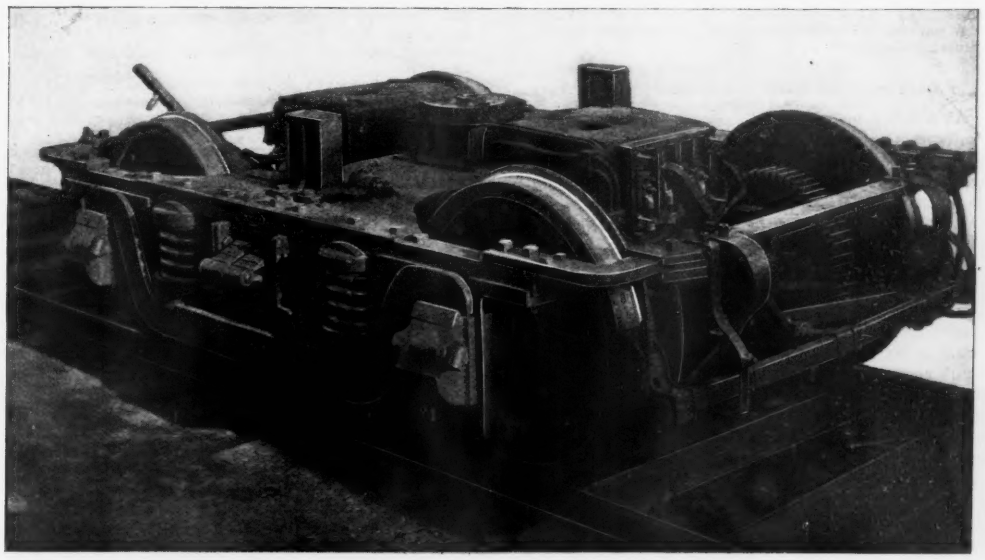

Fig. 3.—Trucks for Motor Cars—Hartford-New Britain Third Rail Electric Road.

* A paper entitled "Congress Should Exercise Its Exclusive Power of Regulating Commerce," read at the National Convention of Railroad Commissioners, at St. Louis, May 11, 1897, by Howard S. Abbott, of Minneapolis, Lecturer on Public and Private Corporation Law, University of Minnesota; *condensed*.

fore them, intended that the whole commercial interests of the country should be placed under the exclusive control of Congress. The statesmen of that day were wiser than their successors, for they realized that a national question was one for national legislation. The commerce of that time was carried on principally by the merchant marine, and it is a notable fact that the power of Congress to regulate navigation has never been seriously questioned, even when the vessels were plying in state waters exclusively and engaged in the internal commerce of a state. Commercial conditions have marvellously and rapidly changed. New agencies of commerce have arisen and to say that the power to regulate is limited to the commerce and its agencies as in existence over a hundred years ago would be preposterous. What is this power? "*It is the power to regulate*; that is to prescribe the rules by which commerce is to be governed. This power, like all others vested in Congress, is complete in itself, may be exercised *to its utmost extent*, and acknowledges no limitations other than are prescribed in the constitution."

The word commerce applies also to the instrumentalities of commerce. In the Legal Tender cases the Supreme Court of the United States in passing upon the construction of the clause giving Congress the right to enact all "necessary and proper" laws to carry out its numerous powers, said: By the settled construction and only reasonable interpretation of the clause, the words "necessary and proper" are not limited to such measures as are absolutely and indispensably necessary, without which the powers granted must fail of execution, but they include all appropriate means which are conducive or adapted to the end to be accomplished, and which, in the judgment of Congress, will most advantageously effect it." In 1804 this Court decided that Congress "must possess the choice of means." So in regulating navigation Congress has not confined itself to the regulation of vessels actually engaged in commerce among the states, but has extended its control over all, basing its action upon the reason that from the constant commingling of vessels, a regulation of a portion only would be utterly ineffectual. And there is no difference in this respect between the commerce carried on by land and that by water. The instrumentalities and agencies of commerce are constantly passing and repassing state boundaries and coming in contact with those that do not. How ineffectual to prevent disaster would be the regulation providing for red and green lights on vessels if a portion plying in the same waters could escape compliance with the law by claiming to be engaged in the purely internal commerce of a state. How ineffectual would be a law requiring that passenger cars, engaged in commerce among the states, be equipped with safety brakes of a certain pattern, if on passing through a state a car without such brakes, engaged in its internal commerce, could be placed in the middle of the train, destroying the efficiency of the mechanism by breaking continuous connection. The sound legal and logical position is that regulation is designed for the entire result, applying to those parts which remain as they were as well as those which are altered. It produces a uniform whole.

Commerce to-day is practically all commerce "among the states"; it does not regard state or county lines; it does not heed political divisions; it is truly national in its scope and character, and is, as Chief Justice Marshall said, "commerce that concerns the states." Considering, then, the meaning of the word commerce, the extent of the power of Congress, the character of the commerce of to-day and the necessities of the situation, we cannot but conclude that Congress should exercise exclusive power and control of legislation regulating commerce.

But independent of the exclusive power of Congress, questions of policy and the present character of railway legislation demand that the exclusive right of regulation should be exercised by the Federal government to the exclusion of state interference. The great defect in the laws as found to-day is their lack of uniformity, and when the diversity of state constitutions, the conflicting provisions of state statutes, the different powers of railroad commissions and the sectional motives of state legislatures are considered, the impossibility is apparent of ever securing uniform action under those conditions. The character of legislation passed by Congress would necessarily be uniform, would be more just, owing to the greater deliberation of that body and the broader, more intelligent character of its members. Local prejudices would have less weight, the greater part of a fruitful source of corruption would be removed, for it is said the lobbyist is abroad in the land, and the whole problem would be considered at that point of view from which the greatest good to the greatest number would inevitably follow.

A national question should be considered from a national standpoint.

Painted or Planished Iron Locomotive Jackets.

At a recent meeting of the Southern & Southwestern Railway Club the following letter from Mr. R. H. Soule, Supt. M. P. Norfolk & Western, was read. It was written in answer to the Master Mechanics' Association Committee on Boiler Jackets, and is his opinion as to the relative value of painted or planished iron jackets and on some other points.

"This depends on the kind of paint used and the process of applying the paints, and also the kind of service the jacket is subject to. We believe that no jacket ought to require repainting in less than three months, or could be expected to last more than 12 months. We think that planished iron, if painted over, will not last as long as regular sheet steel or sheet iron if painted over.

"We use what is known as 'Black Nile Engine Finish' (made by the Flood & Conklin Co., of Newark, N. J) for painting steel or iron jackets; we are not able to give you the cost per square foot.

"We advocate using Princess metallic brown for the inside painting of jackets no matter whether made of planished iron or ordinary sheet iron or sheet steel.

"Jackets if not painted on the inside will rust away very rapidly, especially if supported by asbestos cement boiler coverings. A considerable amount of outside wear will also occur if there are acid drippings from roundhouse roofs. If wooden lagging is used and not renewed often enough the jacket will wear rapidly by being battered from the outside.

"As above stated, magnesia or asbestos plaster is apt to corrode the inside of the jacket unless it is thoroughly protected by some good paint. On the other hand these materials give a much better support to the jackets than wooden lagging, especially after the latter has become charred and begins to crumble.

"We figure that the labor of applying jackets, including framing, riveting, etc., is about 6 cents per square foot, no matter what material they are made of.

"We figure that the average cost of jacket material per foot is about as follows: Planished iron 7.9 cents, sheet iron 2.0 cents, sheet steel 2.0 cents.

"Our planished iron jackets are made from sheets .022 in thick (decimal gage), but we think that for painted jackets much heavier sheets ought to be used.

"Acid dripping from roundhouse roofs seriously affect planished iron, but seem to have little or no effect on painted jackets of sheet iron or sheet steel, if good paint has been used and properly applied.

"The general opinion is that these jackets suffer most from internal rusting when they are supported by magnesia or asbestos cement boiler coverings. The destruction is more rapid with planished iron or with ordinary sheet iron or sheet steel, however, but we think this can be remedied or reduced by thorough painting of the inside of the jacket sheets."

Cost of Equipping Old Freight Cars With Air-Brakes.

At a recent meeting of the Southern & Southwestern Railway Club a committee presented a report on equipping old freight cars with air-brakes. The first conclusion is that there is no question that all new rolling stock should be equipped in full with air-brakes and metallic brakebeams, and the committee especially considers the subject of old cars of 40,000 lbs. capacity. Information was called for from the makers of special parts, and, taking the cheapest parts and material reported, the committee arrives at the following statement of the cost of equipping an old freight car, using all the old brakebeams, hangers and safety chains.

4 air-brake beams trussed, with ⅞-inch rods and nuts	$1 56
4 cast fulcrums	1.20
Small bolts	.40
8 new end caps for trussed rods on brakebeams	.4
Labor sawing out old brakebeams for trussed rods	.20
Air cylinders, blocks and bolts	.50
Westinghouse air-brake equipment	36.00
Train pipe fittings	3.4
Foundation brake gear (lowest bid)	11.5
Making a total of	$54.50

We now call your attention to a complete new foundation gear for cars, at an average for each part, as near as we could ascertain:

Westinghouse air-brake complete	$36.00
4 National hollow brakebeams and heads	12.00
Foundation gear complete	11.0
Cylinder blocks and bolts	.50
Car pipes	3.40
Lag screws and small bolts	.55
Labor for applying	1.55
	$65.00

Old hangers and safety chains being used in this case, scrap cost being the same in both cases, are not mentioned; freight is not charged on new material, as most of same is chargeable in both cases.

These parts can be varied by the appliance of malleable iron in place of cast iron, providing the distance is not too great, which would cause the freight to raise the price of the article too much, but where it is possible to be used the committee would urgently advise that malleable iron be substituted for cast, as such material saves the wear and tear of the brake rigging by reducing the weight fully a third. It is also more than likely that these figures can be reduced (for new material) when purchased in large quantities, while the work done at home, first exhibit, may increase the home production, owing to the limited force, one is not able to keep the men steady at work, as is the case when you apply new material already fitted up and use piecework prices.

MR. SANDERSON: A few days ago I had the privilege of examining a lot of brakebeams, both metal and timber, which had been tested to destruction, or as near as possible, and the wooden beams stood the test better than any of the metal beams.

The PRESIDENT: What kind of wood was it—was it hickory?

MR. SANDERSON: No, sir; it was oak. I believe it would pay to apply wooden beams, saving $4 to $5 a car, instead of putting in metal beam, while I would prefer metal beams on very heavy cars.

The PRESIDENT: The principal objection to the wooden beam, as the committee says, is the difficulty of getting it high enough. We were poor and wanted to use something within the limit of our means, but when our President looked at the metal beam, he said that he still thought they were a luxury. I believe in the wooden truss beam as being amply strong. It is remarkable how much they will stand. I certainly would not advocate the expense of metal beams if it were not for the other things.

Boult's Audible Signal.

The engravings shown herewith illustrate the construction and operation of an electric signaling device, suitable for the automatic or the non-automatic block system, lately invented by Mr W. S. Boult, Assoc. M. Inst. C. E., of London. The experimental use of this apparatus for several months on the Manchester, Sheffield & Lincolnshire Railroad having been favorably spoken of, we requested Mr. Arthur H. Johnson, now in London, to send us an account of the invention, and his description appears below.

Schemes for producing audible signals on a locomotive are objectionable, principally for two reasons; they require that every locomotive be fitted with special apparatus and they involve the use, at fixed points along the road, of contact pieces, or their equivalent; and the details are in some respects troublesome. Besides this, difficulty has been experienced in carrying electric batteries upon locomotives. In regard to the first objection, Mr. Boult's invention is on a plane with the previous attempts in the same line; an engine not specially prepared, or a car or train moved over the road without an engine, can receive no protection or benefit from the signal. But in other respects, and especially in avoiding the shocks arising from violent contact of metal with metal, this device is ingenious and simple; and as a good example of its kind is worthy of notice. The distinguishing feature of the invention is the use of permanent roadside magnets to stop trains; of electro-magnets, operated by a signalman or by the passage of a train, to counteract the permanent magnets and give a go ahead signal, and of such location of the apparatus on the track and on the engine that signals are conveyed from the former to the latter without the use of contacts. Mr. Johnson, it will be seen, describes an apparatus arranged to be operated from a signal-cabin; but the method of using the same in automatic signaling is practically self-explanatory after the operation of the scheme by manual control is described. Mr. Johnson says:

The most trying natural condition under which great railroads operate their lines is undoubtedly during dense fogs, which in many localities occasionally invest miles of country for several days. The distressing nature of the London fogs is proverbial, and yet the railroads manage to handle the vast traffic of the great metropolis fairly on time, in spite of the total eclipse of their whole system of fixed signals at a time when it is of vital importance to both safety and despatch. This is accomplished by holding a large number of men under orders, night and day, to report for fog duty at short notice. These men are told off to stand by the fixed signals, and repeat them to the enginemen by a code of detonating signals. They are generally drawn from the roadway department, and many cases have occurred of extreme privation during exceptionally severe weather, in fogs of long duration, when the local officials are often unable to send out relief men.

Numerous attempts have been made to design mechanical fog signaling apparatus, with a view to meet the demand of the transportation officers for a signaling apparatus that will overcome the present dangers and expense of "fogging." Many of these schemes have a miniature signal fixed in the locomotive cab; this signal is to repeat the position of the fixed line signal by means of connections, either mechanical or electrical, which, fixed to the lower part of the locomotive, make contact with suitably adjusted triggers, etc., placed in the open, alongside the line.

Mechanical fog signals have generally been unsuccessful, because the contact between the members on the engine and those on the line takes place by means of ponderable matter, possessing considerable inertia and momentum; this is necessary in order to prevent accidental displacement at high speed. Then, again, the moving parts of the line members are exposed to impediment by snow and ice, and also to breakage.

It appears probable that Mr. Boult has succeeded in solving this difficult problem by means of magnetic induction. His apparatus is not dependent upon the speed of the engine, as signals may be received in the cab while the engine is either standing still or going at full speed. The arrangement is shown diagrammatically in Fig. 1, and the detail construction by Figs. 4, 5 and 6.

The line apparatus consists of a series of magnets *n*, *r*, *n*, *r*, placed in channels, cut in the face of the ramped wooden block, shown dotted. The bars *n n* are permanent magnets, while those lettered *r r* are electro-magnets, joined in series to the line wires *w* and *x*, which go to the battery and controlling switch, which may be either at the signal cabin or at the signal itself. When the signal is at danger, no current is flowing in the electro-magnets, so that normally a magnetic field of predetermined polarity is furnished by the permanent magnets, as shown by conventional lines of force at Fig. 2, which shows the effective field only.

The parts lettered *s*, *p*, *a*, *c*, *b*, *f*, *d*, *m*, Fig. 1, are carried by the engine. The signal box *s* is fixed in the cab, while the soft iron collecting bars, or armature *f*, *m*, are carried below the engine at any convenient horizontal position to suit the particular design of locomotive, and at a vertical distance such as to give a normal clearance of 2½ in. between the magnets *n r* and the armature.

Wires *a*, *b* and *c* form two distinct electric circuits, passing into the signal box, and are connected to a battery of dry cells, an electric bell and a suitable set of electro-magnets to control the position of the miniature signal. The knob *p* is a plunger, by means of which the bell is stopped, and the signal returned to danger. *d* is a polarized contact needle, the nearer end being north, pivoted at its center of gravity on the end of the conductor *c*, and normally induced to a central position, as shown, by the magnet *e*. The parts *a*, *b*, *c*, *d* and *e* are enclosed in a small air-tight brass box.

In the position shown, the armature *f m*, being of soft iron, is not polarized. Now imagine the engine to move forward in the direction of the arrow, and to pass over the magnets *n r*. It is obvious that the armature *f m* will cut the magnetic field, Fig. 2, and as the magnetic permeability of iron is many times greater than that of air, the lines of force will pass through the armature and across the small air gap $S_1 N_1$. The north end of needle *d* is instantaneously attracted toward *S*, bringing the short end in contact with conductor *b*, when an electric current flows from the battery through *b* and *c*, and starts the bell, which draws the engineman's attention.

The small semaphore is not affected by this contact,

and remains at danger, constituting, together with the audible warning, the danger signal. On receiving this signal, the engineman would push in the plunger *p* to stop the bell and then bring his engine to a standstill. In order to have a positive visible indication in addition to the bell, in case of receiving the danger signal, a little red disc appears at an aperture, but this is not shown in the sketch.

If, now, the fixed line signal were at safety, an electric current would be flowing through the coils of the electro-magnets *r r*. The sectional area and ampere turns of these magnets are such that their magnetic field strength, as compared with that of the permanent magnets, representing opposite polarity, 3 : — 1. The resultant effective field strength will be equal to the algebraic sum 2. The effective field of the electro-magnets is shown in Fig. 3 by lines of force. If, now, our engine has been brought back, and is again moved over the magnets *n r*, the armature *f m* will again cut the lines of force, but we have seen that the resultant field is of the opposite polarity to that shown at Fig. 2, and that the force or magnetic flux is in the proportion 2 : 1. The extra flux in favor of the electro-magnets is to allow for variation in current strengths, where a primary battery is used.

The north end of *d* is now attracted toward *S*, Fig. 3, and the electric circuit *a c* is made; the signal arm in the box in the cab goes to safety and the bell is again

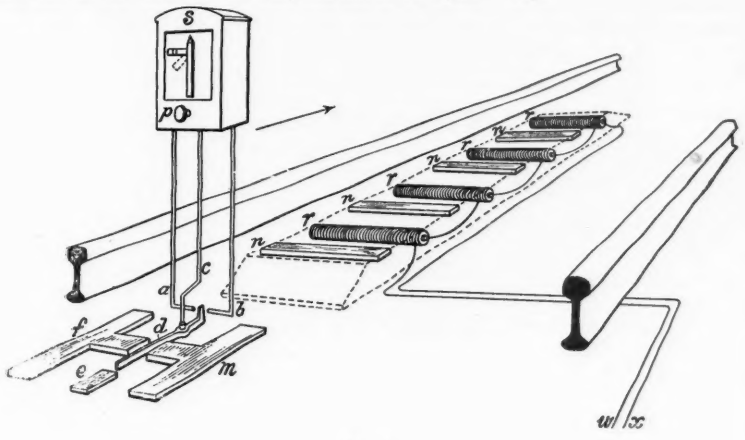

Fig. 1.

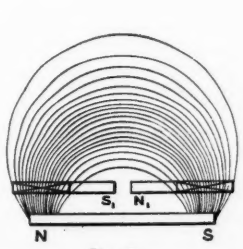

Fig. 2.

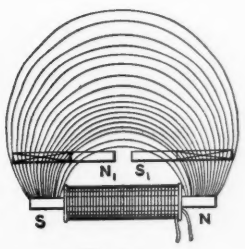

Fig. 3.

started, thus drawing the attention of the engineman, who, after seeing the signal, presses in the plunger *p*, thus replacing the signal at danger and stopping the bell.

It is evident that if the armature *f m* is brought to a stand anywhere above the magnets *n r*, the signal in the box *s* may be operated at will from the signal cabin.

Allowing for the magnetic reluctance and mechanical inertia of the various parts, it is estimated that a length of 10 ft. would be sufficient for the line apparatus, allowing an engine speed of 60 miles an hour. This would take 10 permanent and 10 electro-magnets. A smaller number of magnets could be used for slower speeds.

The Manchester, Sheffield & Lincolnshire have made a trial of Mr. Boult's apparatus in an imperfect form, on a branch line, and I am informed by the civil engineer in charge that the experiment was most satisfactory. I have tested this apparatus and find that at slow speed the magnets operated the signal even when moved to a distance of 6 in. away from the armature. The M., S. & L. officers are now arranging to try the device on the main line in connection with one of their new express engines.

It is obvious that gear may be added whereby steam is shut off, and the brake applied, by the mere fact of the signals being against a train, but the advisability of doing so is debatable.

There is no pratical objection to carrying a dry battery on the engine. It is proposed to pack the jars in cotton wool, and make all the connections of flexible wire. Four jars in series are quite sufficient, but as Mr. Boult suggests making all moving parts and connections in duplicate, there would be practically two batteries or eight jars in all.

The accidental making of either the safety or danger contact by ordinary vibration is guarded against by mounting the contact needles on spindles passing through their centers of gravity.

Fig. 4 is a sectional end elevation, and Fig. 5 is a plan of the armature and contact-box. Fig. 6 is a sectional part elevation of the line magnets. *A A*, *B B*, *b b* (Figs. 4 and 5) are the six parts of the soft iron armature, with air gap, having the soft iron post *E* in the center thereof. *C C* are polarized contact needles, centered respectively at the north and south poles of the permanent magnet *D*. The magnetic flux passes from one pole of magnet *D* through needle *C*, post *E* and the other needle *C*, and so the needles are normally directed to the position shown. It will be seen that the post *E* also subdivides the air gap between the needles when they are deflected, and so assists their return to the normal position.

The gun metal contact posts *F* carry adjustable platinum-tipped contact screws, and the needles carry corresponding platinum spring contacts too small to be shown. *G G*, Fig. 5, are insulating blocks. *H* is a brass air-tight box 3 in. × 4¼ in. on plan. *K K* are keyed pins which serve to clamp the accurately finished box parts to the soft iron bars *B* and A. *J* is a brass yoke. The above parts are attached to a convenient part of the engine frame by means of downwardly projecting stays, carrying oak rails, to which the collecting bars are screwed.

E and *P*, Fig. 6, are the electro and permanent magnets, respectively. They are about 12 in. long. *A*, Fig. 6, shows the relative position of the armature and contact box carried by the engine.

The thick line just above the magnets represents a sheet brass cover plate The level of this plate would in America coincide with the top of rail. It will thus be seen that there are no moving parts on the track or roadway.

driver sees at a glance whether it is a distant or a home *or both*. The strong point in favor of this duplication is where home and distant occur on the same post, which is the rule rather than the exception in some localities.

For automatic blocking the inventor adds what may be termed reciprocal mechanism, for automatically operating the signals. The engine carries a set of magnets like those in Fig. 1, and the armature is fixed on the line. This latter opens or closes electric circuits the same as track treadles. The train magnets could be carried by the rear car instead of by the engine.

Electric locomotives may be fitted with this signal by placing the apparatus well out of the more intense part of the magnetic field induced by the motors and conductors; and as ample current could be obtained the signal magnets could be made much stronger, and therefore less liable to interference by stray fields.

It would appear then, that in Mr. Boult's invention we have a solution of the fog signal problem, approaching as near as possible to infallibility of action on the danger side. With proper inspection and maintenance it should at least be as sure of action as the air-brake. Detonators, or torpedos, are not quite infallible. The writer remembers riding on an engine after a heavy fall of snow, and being stopped by a torpedo which he did not hear, and which the driver only detected by the

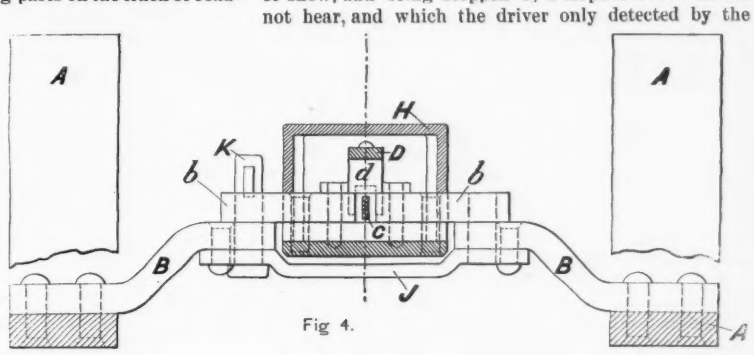

Fig. 4.

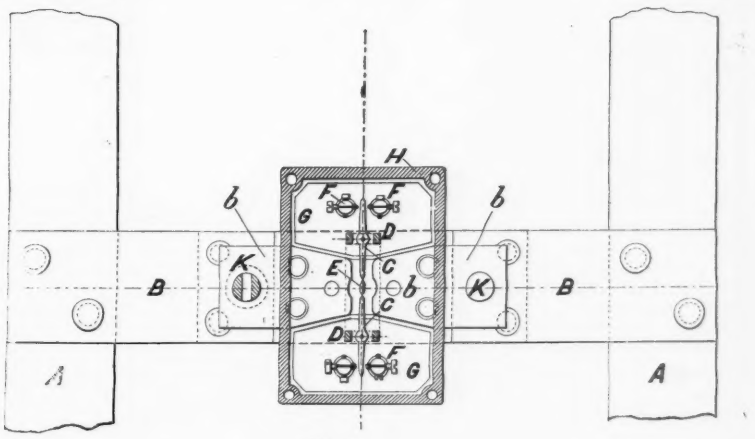

Fig. 5.

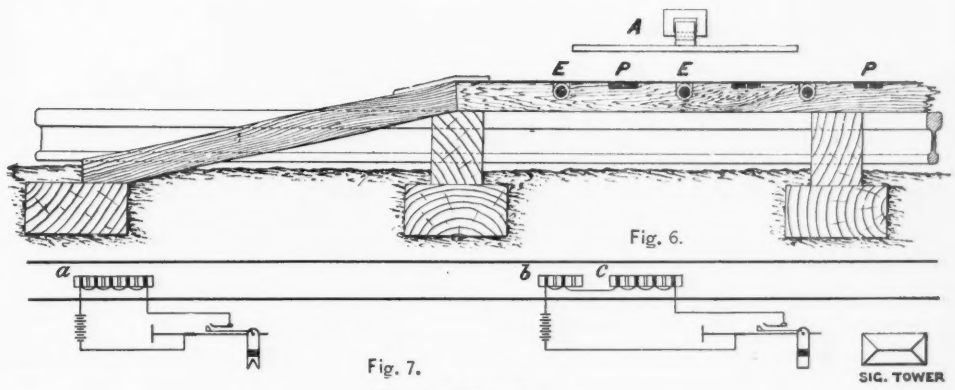

Fig. 6.

Fig. 7.

Boult's Audible Signal

Fig. 7 shows diagrammatically one way of applying this signal. The distant signal is served by one set of line magnets, and the home signal by two sets. When the signals are at danger, no current flows from the batteries, and a train approaching in a fog gets the danger signal at *a* from the permanent magnets and prepares to stop at the home. The speed at *b* would then of course be very slow, and the engineman would again get the danger signal at *b*, and as he would know the exact distance from *b* to *c*, and would also be assisted by a marker, he could generally bring his engine to a stand over *c*, and wait for the clear signal. Of course if the signals were at clear, he would receive the clear signal in the cab, and proceed at his usual speed.

To provide for engines running tender first, a commutator is operated in connection with the reversing lever, so that the electric circuits are crossed over.

Mr. Boult arranges to distinguish distant signals from home signals by placing the distant magnets toward the left hand rail, and the home magnets toward the right hand rail. Two separate sets of armatures and signals are carried by the engine to coincide with the home and distant signals respectively, and so the powder smell. He said he thought he heard a report, but was not sure until he smelt the powder.

Tonnage Rating on the Southern Pacific.

The Southern Pacific Co. is preparing to adopt schedules of tonnage rating for its freight locomotives throughout the whole of its lines, the plan having been in use with satisfactory results on the Western Division for two or three months. Experiments are now being made, and in order to secure uniformity on the widely separated divisions of the company—some in Texas and some in Oregon—General Manager Kruttschnitt has issued to the 15 superintendents of the company a circular outlining the plan adopted on the Western Division. A train of loaded cars is made up, with a list showing the weight of one car, of the first two cars, the first three cars, etc., and this is supplemented by a list beginning at the rear end. Weights are shown in "Ms" or units of 1,000 lbs. This train is tested on a level or on an easy grade, with one of each class of locomotives in use on that division, and then, with a locomotive of one class only, it is tested on the ruling grades. In these last tests an engine facing backward is attached to the rear end of the train, to attach and detach cars where necessary, to act as a helper where needed and to act as the hauling engine where grades are tested both sides of summits. Tests are being made both starting from a standstill and in the usual way, up grades at ordinary speeds.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

As will be seen from our Chicago letter, there is already a proposition to make a lot of changes in the association agreement of the Western roads. It is impossible to say whether this is a result of actual dissatisfaction on the part of the managing officers of the roads, or is simply an attempt of the five commissioners to get up a constitution under which they can do some effectual work. It does not make much difference, however, for written agreements are now of little or no value. If they deal only with the publication of tariffs, and the business of "checking up" rates, the rate clerks might as well be allowed to make their own regulations to suit themselves. If an agreement deals with any vital element of the making or maintenance of rates, it is unenforceable. No president's promise to maintain rates, or even his expression of intention to maintain (omitting the word "promise" as illegal), is of any value now unless he is a man of honor, who keeps the spirit as well as the letter of his vows; and as long as there is *one* president who is not of this character all the others will, of course, be careful not to give utterance to any vows except with a reservation, more or less clearly expressed, to cut rates when they begin to lose business. That this reservation has been made in the so-called agreements of the last two months is evident from the large number and the definite character of the rumors of rate-cutting. Pledges of renewed "honor" have, according to a Chicago paper, been made four or five times already since the Supreme Court decision, but still the troubles continue. One of the curiosities of the proposed new agreement is the following:

> Art. VI. Sec. 6. The Board of Commissioners shall, so far as practicable, work in harmony with, and secure the co-operation of, freight associations in adjacent territory, and where lines members of this association are also members of other associations, such lines shall be given fair and equitable protection against any unlawful manipulation of rates between members of this association and lines not members of this or adjacent associations, so far as can be done legally.

How can any line or any association "protect" against another line or association except by openly reducing rates or by discovering illegal practices and giving evidence thereof to the courts? An association is of no value in making reductions of rates; it is no more necessary than an association for the purpose of wasting coal or for making unnecessary mileage with empty cars; such processes go on of themselves if not disturbed. And as for exposing illegal rates, association agreements have been pretending to provide for that for a long time, but without, so far as we can see, a particle of success.

The communication from Mr. M. G. Starrett, Assistant Chief Engineer of the Metropolitan Traction Co., published on the first page, answers the questions raised by Mr. Perry in regard to the operation of the Lenox avenue conduit electric street railroad line in New York City. In his letter last week, Mr. Perry did not touch the real question at issue, but drew his conclusions from incomplete data, and then added that he saw no reason for receding from his position. His original position, as stated in *Cassier's Magazine*, is that "the New York road (Lenox avenue line) is throwing away 25 per cent. more energy than would be necessary or allowable in the overhead system." Mr. Starrett's figures relating to the operation of the Lenox avenue line show that the company is not expending any more energy than it would if the overhead trolley were used. Mr. Perry says that candid people hope for nothing better from the conduit road than that it shall prove equal to the already obtained performance of overhead trolley roads. Leaving out the question of the increased cost of installation we are safe in saying that it has already met this requirement on at least two short lines, and we know of no reason why it should not show equally good results on longer roads. Moreover, we have seen a statement of the cost of the operating expenses of the Lexox avenue line during the month of April last, in which the motive power item was less than that for the average electric road, and the total operating expenses per car mile were lower than those we have seen for any electric line. It is unnecessary here to discuss the disadvantages of the conduit construction, as it is entirely irrelevant to the subject under consideration. New York City does not allow overhead construction below Harlem.

A sense of proportion is important even in trying to save money. A fanatical "watch dog of the treasury" can do a good deal of harm on a railroad as well as in public affairs. Which is as much as to say that there is reason in all things—a proposition which may not strike the reader as altogether new. This wise reflection was brought to mind by the discussion about saving oil on locomotives at the April meeting of the New England Railroad Club. Mr. Sague suggested that it was a considerably more important matter to save coal than to save oil. We have taken up at random the annual reports of three great railroad companies. One of them earns gross about $45,000,000, and pays out for oil, tallow and waste for locomotives one-quarter of one per cent. of its gross earnings. The engine fuel costs 6.6 per cent. of the gross earnings, or, say, 26 times as much as lubricants. On the other two railroads, the fuel bill is 28 times as much as the bill for locomotive lubricants. On one of these roads, the gross earnings are about $14,000,000, and the locomotive oil, tallow and waste costs exactly one-quarter of one per cent. of the gross earnings, while the fuel costs 7.1 per cent. The other railroad considered earns gross over $20,000,000, and the locomotive lubricants cost 0.18 per cent. of this, while locomotive fuel costs 5 per cent. Here, if we should save 28 per cent. of the cost of engine lubricants, and lose one per cent. of the cost of engine fuel, we should be about $100 out of pocket by the operation. We judge that the man who tackles the subject from this standpoint will be a little cautious about saving valve oil.

The St. Louis Convention.

The St. Louis Convention of Railroad Commissioners has given us two good papers, from which liberal extracts are printed in this issue. Mr. Abbott says that Congress ought to regulate all commerce, because interstate and intrastate are so mixed together that they cannot be seperated; and he presents a good analogy in the regulation of commerce on water, in which Congress already ignores state boundaries. The argument, if not considered too broadly, is unanswerable, and the illustration given, that of uniform power-brakes, is perfect. Automatic car couplers furnish another example. What would the Federal coupler law have amounted to if the railroads of the whole country had not reached substantial agreement as to the type to be used, before the law was passed? Any road doing business within a single state could make interminable annoyance and delay if it chose to do so.

But public sentiment, under present conditions, might not readily agree to an extension of the powers of Congress. The exercise of Federal authority over intrastate navigation, long a settled fact, is quite different in scope from the authority which many people now desire to have exercised in regard to railroad transportation. In dealing with navigation—prescribing signal lights, for instance—Congress regulates things that *must* be regulated; in dealing with railroads, if it confined its activities to uniformity of cars and such like essentials, it would still be within like safe limits; but how about rate-regulating? If the Interstate Commerce Commission ever deals with freight and passenger rates all over the country, there will be loud objections from hundreds of state legislators. Innumurable cases would arise in which they would fall back on their fundamental right of home rule, which in this matter means, practically, rule by a power somewhere within a few hundred miles of home.

Nevertheless, it remains true that state and interstate rates are inextricably interwoven—or perhaps we may say, in more accurate metaphor, badly snarled up—and many inconsistencies could be removed if all rates were subject to a single authority. But the Interstate Commerce Commission would need a great accession of numbers and experience, not to say wisdom and statesmanship, to deal with the traffic of 180,000 miles of railroad; and perphaps the most weighty argument to be deduced from Mr. Abbott's essay is that Congress should not try to specifically regulate rates at all. The proposition to extend the field for the exercise of Federal powers in connection with commerce only tends to bring out more clearly the ineffectiveness of what has been attempted in that direction already.

Mr. Jeffery, not so bold as Mr. Abbott, and perhaps more practical, suggests that state railroad commissioners ought to confer more freely and more constantly with railroad officers. Certainly this is an important desideratum if we are doomed to always live under present conditions. Of the great majority of railroad officers it is true, as Mr. Jeffery says it is of himself, that they make and defend certain rates because they fully believe that such rates are just and equitable. For the bulk of all the rates this belief is not only honest, but intelligent; and, this being so, the railroad representatives ought to have the fullest possible opportunity to try to convert state commissioners to their view; and conversely, where a railroad manager is claiming too much, the state official ought to corner him and make him admit the lack of logic in his argument. If state commissions are to permanently exercise close supervision over railroad rates, it will be necessary, in order to preserve a tolerable state of peace in the family, that the commissioners have a fair knowledge of the economics as well as the politics of state regulation (especially as the politics are generally far from being broad and statesmanlike); and one of the best things to do to acquire this knowledge is to associate with experienced and high-minded railroad managers. A few examples from their experience are often more valuable than any quantity of transportation theory.

Mr. Abbott lays it down, unequivocally, as an axiom, that the regulation of railroad rates by means of two hostile bodies, the railroad managers and the state commissions, will surely result disastrously, for it is like the management of a house divided against itself, which cannot stand. If we wish to be in a position to dispute Mr. Abbott's dictum, we must mitigate this hostility as much as possible. The reality of its existence, in spite of more or less superficial harmony here and there, is shown when we consider the antecedents of most railroad commissions. In arguing against the proposed new railroad law in Florida two weeks ago (which argument, however, was unavailing), the Jacksonville *Times-Union* said:

> The bill now in the hands of the governor is an extremely radical one and should be vetoed. It takes the management of the railroads out of the hands of the men who own them, and vests it in three men to be elected by the popular voie. That is to say, the management of the railroads will, under the law, be by politicians. Now the politicians are personally as good as men of other trades and professions, but their business is to get votes for themselves and others, and not to run railroads. They would run the railroads to get votes—that is to say, they would not abandon their trade when they took charge of the roads, but would make the running of them a help to them in their original business. This is inevitable. However honest and strong they may be, as men, as politicians, they must observe the laws of their trade. They will manage the roads, therefore, not as the representatives of the men who own the property, or of the other men to whom the roads owe money, but as representatives of those who wish to use the roads at as small cost to themselves as possible. They can better afford to bankrupt the roads than to fail in satisfying the popular demand for lower rates. Indeed the bankruptcy of the roads might be accepted as proof that they had done their duty in lowering rates, and add to their strength as politicians.

Traffic Statistics from Germany and Hungary.

The traffic of the German railroads has increased with a rapidity which we are apt to think peculiar to this country. The statistics for the whole empire show an increase of 75 per cent. in passenger traffic from 1885 to 1895, the mileage worked meanwhile having increased but 21 per cent. The travel in 1895 was at the rate of 167 miles for each inhabitant of the empire. In this country in 1893 the average travel per inhabitant was about 216 miles. The average passenger journey was 14.6 miles there and 24 miles here. The averge rate per passenger per mile in Germany fell in the ten years from 1.288 to 1.138 cents per mile, or abuot 12 per cent. The average passenger rate here was 2.108 cents in 1893, which was 10 per cent. less than in 1888, but seven-eighths more than the average German rate.

The German freight traffic in the same ten years

increased 57 per cent., or much less rapidly than the passenger traffic. The freight movement in Germany was equivalent to 330 ton-miles per inhabitant; here it was equivalent to 1,422 ton-miles per inhabitant, or more than four times as much. The average length of haul was 62¼ miles there and 125¼ miles here. The average German freight rate fell in these 10 years from 1.429 to 1.376 cents per ton per mile, or less than 4 per cent. There has often been a greater decrease than this in a single year in this country, and from 1888 to 1893 the decrease in the average was 12 per cent. The average in the latter year was 0.878 cent per ton mile, which is 36 per cent. less than the German rate.

At the German rates the American railroads in 1893 would have earned $139,445,000 *less* from passenger and $416,068,000 *more* from freight, and from both $276,000.000 *more;* in connection with which it may be noted that the dividends paid by American railroads that year were less than $84,000,000, and the interest paid on their bonds $250,000,000. On the other hand, at the American rates of 1893 the German railroads in 1895 would have earned $88,400,000 *more* from passengers and $137,600,000 *less* from freight, or in all $49.200,000 less, which is about one-seventh of their actual earnings from passengers and freight.

The growth of passenger traffic on the Hungarian State Railroads continues uninterrupted. The latest report covers the year 1895. The statistics do not give passenger mileage for the earlier years, but only the number of passengers. As the mileage worked has increased constantly, the number of passengers per mile of railroad is given, as follows:

1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.
1,306	1,808	1,958	3,491	3,808	4,148	4,206	4,384

The zone system was adopted August 1, 1889, on most of the lines, 11 months later on one line, and two years later on another line. The use of the number of passengers instead of the passenger mileage per mile of road makes the comparison very imperfect, and renders the figures entirely useless for comparison with other countries; but as the length of the average journey in Hungary, during the time that the rates have been established, is not likely to have varied greatly, the figures doubtless represented fairly well the actual progress of the traffic since 1891. They indicate an increase of 15 per cent. in the density of traffic since 1892, and of 5¼ per cent. since 1893.

The passenger earnings per mile of railroad meanwhile were in *dollars:*

1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.
1,572	1,606	1,785	1,945	2,024	2,175	2,284	2,317

The increase in earnings since 1892 is 9½ per cent., while the number of passengers increased 15 per cent., indicating that the average journey has somewhat decreased. But the general progress of passenger earnings has been satisfactory even in the later years, not to speak of the great increase since the year before the zone tariff, amounting to 47 per cent. There can be no question that the old tariff was to such an extent prohibitory that it preventad the development of a profitable traffic, and that the zone tariff has been a great improvement.

The mileage worked has increased from 4,354 in 1888 to 4,862 in 1895, and is therefore exceeded by that of many of our railroad companies. But Hungary, in an area little more than that of Illinois and Iowa together, although more purely agricultural than either of those states, with only one large city, has a population of 17½ millions, which is at the rate of 2,330 per mile of railroad (not all state railroad), while in this country the population is but 380 per mile of road. And after all the development given to travel by the stimulus of the low rates for so many years, the average travel per inhabitant in 1895 was but 54 miles in Hungary, against 167 miles in the German Empire and 216 miles in this country.

The average receipt per passenger-mile in Hungary in 1895 (for which year the passenger mileage is reported) was 0.966 cent, which is one-seventh less than the average in the German Empire. Little more than 4 per cent. of the Hungarian travel was first class, and 65 per cent was third (the lowest) class. The low rates have apparently not made large trainloads, for the average number of passengers per car *axle* was but 3.4, or 6.8 for a four-wheeled car, and not one-fourth its capacity.

So much is said of the passenger traffic of the Hungarian railroads, owing to the interest in the effect of their zone tariff, that it may be thought that this traffic forms their chief business. In reality, however, their earnings from passengers are comparatively insignificent, as in most other countries where the population is chiefly rural. In 1895 only 24 per cent. of their earnings were from passengers. The passenger traffic was equivalent to 265 persons carried each way daily over the entire mileage. The freight traffic, on the other hand, was equivalent to 581 tons each way daily. While the average rate per passenger in Hungary is less than half ours, the average rate per ton-mile was 1.454 cents there against 0.878 cent here.

At American rates the Hungarian railroads would have earned $10,770,000 *more* from passengers, but $10,811,000 *less* from freight. At the Hungarian rates the American railroads (1893) would have earned $162,618,000 *less* from passengers and $538 137,000 *more* from freight. The passenger traffic was equivalent to 115 each way daily in America. against 265 in Hungary; the freight traffic to 755 tons each way daily in America, against 581 in Hungary, the population in Hungary being six times as great per mile of railroad as in this country.

The Railroad Bond Market.

Railroad bonds since the presidential election have fluctuated within a moderate range of values. Toward the latter half of this six months' period there have been two separate movements. First-class bonds have advanced and held their gains, while other issues have, in the main, declined and failed to recover. These movements are perhaps best traced by taking for comparison the dates on which the stock market turned.

The highest average was reached by stocks Nov. 10. Based on returns made by 20 active stocks, it was 56.68. The decline that followed culminated Dec. 18 in an average of 49.98. The rally continued up to March 16, carrying the average up to 54.21. The price April 28 was 55.77. In the table of bonds accompanying, prices are given as recorded on the dates named. The average advances and declines form one swing to the other, and the total average movement are noted.

In general, the entire tone of both the stock and bond markets was changed for the better about the middle of March through the success attending the Lake Shore funding scheme and the possibilities in that direction for other first-class railroad properties. Another factor in sustaining the price of the good railroad bonds has been the steadily decreasing interest rate for money and the accumulation of money that under normal conditions would have had an outlet in the commercial world. Railroad bonds, even at current prices, afford a more inviting medium of investment because of their yield than call loans. These afford only a minimum income of, say, from 1½ to 2½ per cent., but they permit a capitalist to regain the use of his money in a hurry. With confidence in the stability of values, the first-class listed railroad bond has a similar character. The character of the demand is shown in another way. No security that does not meet with a ready market is wanted, except at a price below its intrinsic value. It is difficult to secure a loan on unlisted collateral, while it is just now very inopportune to attempt to float new enterprises. A feature of the demand has been for small lots of good bonds.

Europe was quite a liberal buyer about the time the Lake Shore funding plan came out. The Grecian-Turkish trouble checked these operations, and subsequently caused quite liberal selling for foreign account. Is is understood that the promoters of the Lake Shore and New York Central fundings, as well as other interests which will shortly be compelled to retire outstanding issues, expect to sell very extensively in Europe. As these transactions are consummated, they are likely to fill the demand for Americans unless there is material improvement in business conditions in this country.

Following is given a table showing the averages of the different groups on the dates named:

Group.	Av. dec. from election point.	Rally to March 16.	Reaction to April 28.	Net change comp. with elec. point.
Granger....	1.54	2.79	*0.02	Adv. 1.27
Transcontinenal.	1.08	2.40	0.44	Adv. 0.88
Trunk Line	0.71	2.66	0.33	Adv. 1.62
Southwestern....	3.60	2.97	2.61	Dec. 3.24
Southern.....	1.76	3 19	0.98	Adv. 0.45
Receivership	4.49	2.45	2.05	Dec. 4.09
Coaler	1.37	1.48	1.14	Dec. 1.25
Miscellaneous...	1.89	2.20	1.13	Dec. 0.82
Total average..	2.05	2.51	1 08	Dec. 0.63

*Advance.

Four groups, namely the Granger, Transcontinental, Trunk Line and Southern advanced, while of the four groups which declined three are composed largely of so-called speculative issues. The exception is the coal group, which was subjected to a series of influences that will be discussed later. Quite a number of these 1st mortgage bonds, always considered favorites, are now on an 3 to 4 per cent. basis. Consequently any further advance is not likely unless money cheapens materially. Some of these bonds are now selling at or near the highest prices ever recorded, as for example, St. Paul's 4's the C. & O., Richmond & Allegheny 1st con. 4's, and West Shore 4's.

The average movement in the Lake Shore and New York Central issues that are to be funded has been upward, and prices of to-day are approximately top, indicating that the plans are well thought of by capital, and for that matter that they had not, in public estimation, been discounted.

Several successful reorganizations have changed the character of the Transcontinental group. Remarkable stability is shown by Atchison, St. Louis & San Francisco and Northern Pacific issues. There has of late been some evidence of a growing demand for these securities, based on the belief that they are now on bedrock and that present values are really intrinsic values. Moreover, their many ramifications lessen somewhat the effects of local drouth, crop failure, floods or business depression.

The Southwestern and receivership roads have been stock exchange footballs for two months or more, and have stood the wear and tear rather poorly. In the group first named, the Gould properties were favorite targets. The receivership bonds were quite largely influenced by varying prospects of reorganizations, as well as by speculative tactics. The unscrupulous element among bond operators succeed in their efforts to depress values because of the general indisposition of capital to hold any but the better class of bonds. The bonds of the Missouri Pacific have been conspicuous in this decline. The con. 6's lost 15½ points and the Iron Mountain general 5's 5½ points. There was steady liquidation, accompanied by disquieting rumors concerning the financial standing of the company. After May 1 one of causes of these heavy depreciations developed in the story that Messrs. George Gould and Russel Sage, the capitalists who have regularly paid Missouri Pacific's debt, taking therefor collateral bonds, are not on the best of terms. Even the offer of the road's President to discount March 1 interest had only a temporary reassuring effect. The financial skies would be materially brightened if this system's finances could be put in such shape that its solvency could not be questioned by Wall street every time its semi-annual interest falls due. The drop of 9½ points in Wabash 2ds, of five points in Texas Pacific 2ds and 6¾ points in Kansas & Texas 2ds were largely the result of bear operations made possible by the fears excited by the drop in Missouri Pacific issues. These bonds all belong to a class regarded by speculators as a good thing when there is a strong bull movement on in the stock market.

There were many changes in the value of receivership bonds, and, with few exceptions, toward lower figures. The Hocking Valley issues were the most conspicuous in this respect. The Con. 5's lost 20¼ points, to 69, and the General 6's 40½ points to 50¼. This collapse in values was incident to the appointment of a receiver.

Union Pacific issues have displayed fair stability and are selling at good figures. The future of the bonds of this system, judged by various reorganization schemes under consideration, is decidedly brighter than the prospect for the stock. An average drop of four per cent. in the receivership group, following the election, against advances in the better grades of bonds, is indicative of the increasing conservatism of capital.

The coalers, or those outstanding against the anthracite properties, are usually classed among the gilt-edged investments. During the period of this review, the annual reports of a number of important interests brought to light very unfavorable conditions in the anthracite trade. These were followed by reductions on the Delaware & Hudson and Jersey Central dividend rates. There has unquestionably been liquidation. This was particularly true in the case of Jersey Central, whose accounts, in connection with those of the Lehigh & Wilkes-Barre, were called into question. Declines in the bonds of these two properties were sufficient in amount to lower the average, making a loss for the entire group of 1¼ per cent. There has not, at any time been any serious question of the ability of even the weakest of these roads to meet their fixed charges. There are at this writing two distinct Wall street opinions as to the outlook of the anthracite industry. Nevertheless, there is conceded to be nothing in sight likely to render the situation worse than it has been during the past two years, while there are many factors that lead to the conclusion that the future is promising.

The average decline, rally and reaction for each group were as follows:

Grangers.—The average decline from the election rise was $1.54, the rally was $2.79, with an additional advance to present prices of $0.02, making a net advance, since election of $1.27.

Transcontinental.—The average decline from the election high point was $1.08, with a rally of $2.40, followed by a reaction of $0.44, making a net gain from the election high point of $0.88.

Trunk Lines.—The average decline from the election high point was $0.71, followed by an advance of $2.66, from which there was a reaction of $0.33, which left the net gain since the election high of $1.62.

Southwestern.—The average decline from the election high point was $3.60, from which point there was a rally of $2.97, followed by a reaction of $2.61, which showed a net loss from the election high of $3.24.

Southern.—The average decline from the election high point was $1.76, from which there was an advance of $3.19, from which point there was a reaction of $0.98, leaving a net advance since the election high point of $0.45.

Receivership.—The average decline from the election high point was $4.49, from which point there was a rally of $2.45, reacting to $2.05, leaving a net loss since the election high point of $4.09.

Coalers.—The average decline from the election high point was $1.37, afterward rallying $1.48, reacting $1.14, making a net decline since the election high point of $1.25.

Miscellaneous.—The average decline from the election high point was $1.89, rallying $2.20, reacting $1.13, making a net decline since the election high point of $0 82.

The following table gives the prices of representative bonds on the four respective dates:

	High p'int, Nov. 10.	Low p'int, Dec. 18.	Next high p'int, Mar. 16.	Last sale up to Ap'l 28.
Grangers.				
Burlington con. 7s	118½	117½	118	118½
" deb. 5s	100	96	100	101
" conv. 5s	101¾	100	*102½	100½
" Nebraska ext., 4s	89⅜	87¾	91½	92¾
Chic. & Eastern Illinois gen., 5s	101¾	99	101¾	101
St. Paul con. 7s	129	130	134¾	132¾
" Southwest. div. 5s	117½	116½	116¾	119
" South., Minn. div. 6s	117¾	117½	117½	119
" Chic. & Pac. West div. 5s	114¾	113¾	115	115⅞
" Wis. & Minn. div. 5s	111	110⅞	113½	113¼
" gen. mtg. 4s	96⅝	96¼	102¾	101¾
Northwest con. 7s	140	139	142½	145
" gold 7s	118¾	*115¼	119¾	119
" 25-year deb. 5s	105	104½	109	110
Rock Island 1st, 6s	129½	130	131	132
" " ext. 5s	104⅞	103½	105⅜	105
" " deb. 5s	99⅝	92	*96½	97½
Minneapolis & Omaha 6s	128	126⅝	131¼	130¾
Bur., Cedar Rapids & North 1st	107	104½	107½	107½
Minneapolis & St. Louis con. 5s	101	98¾	103¼	103½
Iowa Central 1st 5s	100	96	96¼	90
Mil., Lake Shore & West 1st	129	130	133⅜	133⅛
" " " ext. 5s	112	112	112½	115
Transcontinental.				
Atchison gen. 4s	80¼	77¾	83¼	*80
" adj. 4s	44¾	40½	47¾	44¼
Northern Pacific 1st 6s	116½	115	116¾	116¾
Manitoba, Dakota, ext. 6s	116½	116	120¾	122
Manitoba, 1st con. 6s	122	124	125¼	126¼
" 1st con. 4½s	103¾	104	107	106⅜
" Montana ext. 4s	88	86	92½	92½
South. Pac. of Arizona 6s	94	95	93¾	94½
" " " California 5s	87½	86⅜	88	88
" " " New Mexico 6s	105	104½	103½	104¼
Denver & Rio Grande 1st 7s	112	110	112⅜	112⅜
" " 4s	91¼	90	89	88
Rio Grande Western, 1st 4s	76½	75	73½	72¾
Oregon Railway & Nav. 1st 6s	112½	112¼	113½	113
" " con. 4s	82¾	79⅜	83½	82⅜
St. Louis & San Fran. 2d 6s, "A"	112	110½	114¾	115
" " " "B"	112	110½	114¾	115⅝
" " " gen. mtg. 6s	109	109½	112¼	110¼
" " " " " 5s	97½	96½	97¾	96
Trunk Lines.				
Erie, 1st con. 7s	138	138	140	140½
Long Dock 1st 6s	132½	132½	136	*134
Erie, prior lien 4s	93	92	95¼	93⅛
" gen. lien 3-4s	66	63½	65⅞	63½
Lake Shore 1st 7s	114	113½	113½	112¾
" " 2d 7s	121¼	*117½	124¼	123⅛
Michigan Central 1st 7s	114¾	114½	118	119
New York Central 1st 7s	120	119	121	120¾
" " " deb. 5s	106	105	109	110
" " " 4s	101	100¾	104½	105⅛
West Shore gtd. 4s	106¼	106½	107½	109½
Rome, Wat. & Ogdens. con. 5s	117½	116½	121	*119
New York, Chic. & St. Louis 4s	104	103¾	106¼	104⅞
Pennsylvania 1st gtd. 4½s	112	111	111	112¾
Pitts., Cin., Chic. & St. Louis 4½s, "A"	106½	108½	109⅜	110
Southwestern.				
Kansas & Texas 1st 4s	85½	*80¾	85	83½
" " 2ds	61⅝	55½	60¼	55½
Missouri Pacific con. 6s	89½	85	85	74
" " 3d 7s	103	103	98	99¼
Iron Mountain gen. 5s	77½	74	76	*70
St. Louis Southwestern 1st	70	67⅛	69½	66½
" " 2d	29½	22	24	22
San Antonio & Aransas Pass 4s	58½	56	59¾	57
International & Great Northern 1st	116¾	115½	119½	120
" " " 2d	72	70	77½	74¼
" " " 3d	27	22	31½	31
Texas & Pacific 1st	89	*84	89½	89⅞
" 2d	25	18¼	22	20
Wabash 1st	106	105½	107¼	104⅞
" 2d	73	69¾	69	65½
Houston & Texas Central 1st	110	108	109⅝	110
" " " genmtg. 4s.	67½	66	70	*66
Southern.				
Chesapeake & Ohio 1st 6s, 1911	119	118	121	*120
" " con. 5s	108	107	111¼	112
" " gen. 4½s	75	71½	74⅞	72⅞
" " Rich. & Al. 1st 4s	98	96½	104¼	102
" " " " 2d 4s	88	87	92	91½
Illinois Central 4s, 1952	103	100	104¼	*101½
" " 4s, 1953	101	99¾	101½	100¼
Louis. & Nash. gen. mtge. 6s	116	114½	116½	118
" " unified 4s	80¼	78⅝	80⅛	79¾
Mobile & Ohio nev. 6s	118	117	119	119
" " gen. mtge. 4s	69	67	*68	66½
Nash., Chat. & St. Louis 1st	130	128	130	128¾
" " " con. 5s	100	98	102¾	*99¾
Southern Railway 5s	92½	89	90½	89¼
East Tennessee con. 5s	107⅝	106¼	109⅜	109½
Rich. & Danville con. 6s	119	119	122¼	122
Virginia Midland gen. mtg. 5s	99½	99	103½	101¾
Receivership.				
Brooklyn Elevated 1st	82	74	78	77
" " 2d	45	39	44⅛	43½
Union Elevated 1st	80	71	78½	76⅞
Hocking Valley con. 5s	89¼	86	74⅜	69
" " gen. 6s	91	84½	59⅜	50½
Ft. Worth & Denver City 6s	65¼	50½	59⅝	56¾
Kings County Elevated 1st	50	45	50¾	48
Louis., N. A. & Chicago con. 6s	93	86	84	84
Chic. & Northern Pac. 5s	46½	40	43⅛	41½
Ohio Southern 1st	97⅛	93	90	85¼
" " gen. mtg. 4s	20	17	11	9
Oregon Improvement 1st	85	85	89	88
" " con. 5s	20	17¼	19½	19
Pittsburgh & Western 4s	74¼	73	72	70¼
St. Jo. & Grand Island 1st	51¾	47½	54	52
Tol., St. Louis & Kan. City 1st	75	66	70⅜	69
Wisconsin Central 1st	43½	38	40	29½
Union Pacific 1st, 1896	103	102½	101¾	102
" " " 1897	104½	102½	101¾	102½
" " " 1898	105	103	102⅛	102½
" " " 1899	105½	103¾	102½	103
" " col. trust 6s	96½	95	99½	99
" " gold note 6s	97	97½	102½	101⅜
" " sinking fund 8s	90	87½	93	91
Kansas Pacific con. 6s	72½	65	75	72
Un. Pac., Den. & Gulf 1st	40	34¾	37	34¼
Oregon Short Line 1st 6s	115	111	119	118
" " " con. 5s	68¾	63¾	77¾	75
Utah Southern gen. mtg. 7s	67½	62¾	76¼	75
" " ext. 7s	68	64	77¾	75½
Wheeling & Lake Erie 1st	97	96	91½	91½
Coalers.				
Jersey Central gen. mtg. 5s	118½	118	116¾	116⅜
Lehigh & Wilkes-Barre 7s	104⅜	103¼	95	98
Morris & Essex 1st	140	139½	144	144½
Del. & Hudson Penn. div. 7s	140	141¾	143	143
Lehigh Valley Terminal 5s	110¼	110¼	111¾	*108
New York, Ont. & West. con. 5s	110½	*107	110	110
" " " ref. 4s	90¼	88½	94½	92¾
New York, Sus. & West. ref. 5s	102½	100½	103	102½
" " " gen. mtg. 5s	74½	71	72½	70
Wilkes-Barre & Eastern 1st	90	89	89⅞	90
Reading gen. mtg. 4s	81¾	79½	82	80¼
Miscellaneous.				
Ann Arbor 4s	74½	73	80	*78¼
Broadway & Seventh ave. 5s	118¼	*116⅛	119⅜	118⅜
Brooklyn Rapid Transit	78½	74	80⅜	75½
Canada Southern 1st	110	109½	110½	110½
" " 2d	104⅞	104½	*105½	105½
Miscellaneous.				
Columbus & Ninth Ave. 5s	116¼	116¼	*116	116½
Duluth & Iron Range 1st	103¼	100	101⅜	*98½
Dul., S. S. & Atlantic gen. mtg 5s	100	100	102	101½
Lake Erie & Western 1st	116½	117	115½	115½
Lexington Ave. & Pav. Ferry 5s	116½	115¾	*116	116
Long Island gen. 4s	92	75	88⅛	87¾
Manhattan Railway con. 4s	95¼	94½	94¾	*92¾
Metropolitan Elevated 1st	119	118½	119⅛	119⅝
N. Y., N. H. & Hartford deb. 4s	135½	135	140	*138
Pitts., Shenango & Lake Erie 1st	93	93½	102½	*100⅜
Third Avenue 1st	121½	121½	122¾	121½
Toledo & Ohio Central 1st	103½	107½	102	103½
Tol., Peo. & Western 1st 4s	75	70½	65⅛	60

* Ex-interest.

Annual Reports.

Michigan Central.—This company reports for the year ending December 31, 1896, and has had the remarkable experience of an increase in gross earnings (small, it is true); but as expenses increased in even greater ratio, the net earnings were slightly less than in 1895. The capital stock and funded debt remain unchanged. The miles of road operated amounted to 1,642.37. This is main track. There are also 243.5 miles of second track and 906 46 miles of side track. The side track, it will be observed, amounts to 55 per cent. of the length of the mileage of main track, showing that the system is uncommonly well provided with side tracks. In brief, the main results of operation were as follows:

	1896.	Inc or Dec., per cent.
Gross earnings	$ 3.82 ,614	I. 1.2
Operating expenses and taxes	10,392,350	I. 2.1
Net earnings	$4,429,265	D. 1 1
Per cent. of expenses, including taxes, 75.19, excluding taxes	72.85	

The freight earnings, which were 68 per cent. of the total earnings, were $9.412,462, and the increase for the year was 25 per cent., or $234,498. The passengers earnings, which were 25 per cent. of the total, or $3,545,656, decreased by $126,846, or 3.7 per cent. The earnings from mail, express and miscellaneous increased $62,541, or 7.8 per cent. That is, of the total gain in gross earnings of $170,193, the gain in freight accounted for $234,498; the gain in mail, express and miscellaneous for $62,541. and from this was deducted a loss in passenger traffic of $126,846. In the report the freight traffic is analyzed by through eastward, through westward and local, from which analyses we are able to ascertain that the gain in local freight was $206,137; the gain in through eastbound was $22,892, and the loss in through westbound was $4,533. The earnings from local freight were $6.259,-003, or 67 per cent. of all freight earnings, and the gain there was 3.4 per cent. The local ton miles increased from 810,843,915 to 844,790,346, or 4.2 per cent.; the through ton-miles decreased from 677,145,915 to 635,461,-175, or 10.6 per cent. The local ton-mile rate, which was 0.746 cent. in 1895, fell to 0.741 in 1896; but the through rate rose from 0 462 to 0.496. The average rate was 0.636.

We have shown that the operating expenses increased 2.1 per cent. The actual increase was $209,119, or pretty nearly as much as the gain in freight earnings. In maintenance of way and structures there was an increase of $114,000, in maintenance of equipment an increase of $187,000, and in conducting transportation a decrease of $140,000. The heaviest item of increase in maintenance of way was in ties, and the next in rails. In maintenance of equipment the greatest increase was an item of $105,568 for repairs of locomotives. In conducting transportation the great saving was $121,231 in locomotive fuel. There was a saving of 6,000 tons of coal, and the price per ton was $1.83 against $2.02 the year before. Much the greatest item of saving here was in the price of coal. The miles run per ton of coal by all locomotives were 27.85 in 1895, and 27.90 in 1896, and there was an increase of about three tons in the average freight train load.

The exports of wheat and corn for the month of April, as reported by the Government Bureau of Statistics, amounted to over 21 million bushels, the total of corn being 18,838,377 bu. and of wheat 2,547,097. In wheat New York held its own, showing, indeed, a slight increase (from 1,177,800 to 1,253,011), but of the corn, Philadelphia and Baltimore took nearly half of the entire exports of the country, including both coasts. For the 10 months ending with April the entire exports of corn were 152,053,811 bu., as compared with 83,910,705 in the same period of the preceding year; and the whole of this increase of about 68 million bushels went through ports other than New York. Baltimore took about 20 millions of the increase, Philadelphia 12, Newport News 5½ and Norfolk 4⅛. It will be observed from the table below that New Orleans has not done so well this spring as last, and that the Galveston record has fallen off greatly:

Exports of Corn. Principal Ports, Month of April. Bushels.

	1897.	1896.
Baltimore	4,643,232	1,366,740
Boston	1,331,056	68,174
Newport News	1,516,120	591,986
New York	1,822,952	628 442
Norfolk and Portsmouth	560.408	767,692
Philadelphia	4,414,268	15 ,708
Galveston	43,964	270,848
New Orleans	2 186,207	2,244,887

The Southern Pacific, the Southern California and the Atlantic & Pacific have announced that after May 31 they will not receive private freight cars, except certain kinds, of which the company has not a sufficient stock of its own; that is, live poultry cars, live-stock cars, cars for certain perishable freights, for bulk fluids and for freight of extraordinary weight or bulk. The tenor of this announcement, which we find in a Western paper indicates that the action spoken of is a good example for other railroads to follow; but on second reading we are inclined to doubt whether the exceptions do not take all the force out of the rule. We fear that the rule is about like the uniform classification for freight tariffs which the State Railroad Commissioners so persistently advocate—beautiful on paper but ineffective in operation These roads will have done a good thing, however, if they succeed in shutting out even a few private cars. The prevailing methods of computing the hire of freight cars borrowed or lent is so very inequitable that there is only one tolerable plan for getting along with it, and that is for everyone interested to be both a borrower and a lender. Even that is far from being equitable; it is just barely tolerable.

NEW PUBLICATIONS.

Locomotive History.—The Scientific American Supplement, for April 24, and the two succeeding issues, contains an article by Mr. Herbert T. Walker, of New York City, on the "Evolution of the American Locomotive," which is of more than usual interest. Mr. Walker is a thorough and conscientious student of railroad history, both English and American, having lived many years in the former country and also having made himself acquainted with all available information on the subject in this country. As every one knows, the facts of locomotive history are hard to get at and statements from different sources are often inconsistent. While we have not in detail compared Mr. Walker's statements with those of other writers we feel safe in saying that his essay is remarkably accurate and it appears to have been written with great fairness.

The author takes up the different stages of locomotive invention in this country in strictly chronological order. A good outline of the matter contained in the three articles may be made from the titles of the illustrations, the chief of which are: Stephenson's rack-rail engine, 1825, the first engine to carry passengers on a track in the United States; Stephenson's engine "America," for the Delaware & Hudson Canal Co., 1828, the first practical locomotive seen in the United States; the "Stourbridge Lion," 1828, the first practical locomotive to turn a wheel in the United States; the "Best Friend," 1830, the first locomotive built in America for actual service; the "De Witt Clinton," 1831; the grasshopper type, 1835; the "John Bull," 1831; the "John Bull" as remodeled; the "James," 1832, the first engine with a link motion; Baldwin's "Old Ironsides," 1832; Jervis' engine, 1832, the first engine with a leading truck; the first American 8-wheel engine (Campbell's), 1836; the first engine with equalizing levers, 1837; the "Sandusky" (Rogers'), 1837, the first engine with a driving wheel counterbalanced; Rogers' passenger engine of 1845 for the Hartford & New Haven, and an express engine of the Hudson River road of 1849; Crampton's monstrosity (1847); Rogers' standard passenger locomotive of 1853, having all the essential features of the modern American engine; the first mogul (Rogers, 1863); and the first consolidation (Baldwin, 1866). This completes the list of types, all the principal subsequent types being practically nothing different from the latest of those described, except in size and proportion. The New York Central's "999" is shown alongside of the De Witt Clinton, and the final illustration shows the Vauclain compound freight engine, built for the Erie in 1893, having five pairs of driving wheels and weighing 96 tons.

TRADE CATALOGUES.

Water Pumped by Compressed Air.—The Ingersoll-Sergeant Drill Co., 26 Cortlandt street, New York, has just issued a catalogue on the Pohlé air-lift pump. This apparatus, as is well known, is used for pumping water from artesian wells by means of compressed air. For a description of the air lift pump, the reader is referred to the *Railroad Gazette* of Nov. 10, 1893. This method of raising water has its advantages. It is reliable and not affected by sand or grit. The water is purified by its mixture with the air, and one air compressor will pump from a number of wells.

The economy with which the Pohlé air lift can be worked is largely dependent upon the efficiency of the air compressor. By the use of high-duty compressors, the air lift has reached a degree of perfection that has commended it in a number of places where large quantities of water are required. The inventor of the air lift arranged with the Ingersoll-Sergeant Drill Co. to furnish his devices in connection with their air compressors, and for a time he had charge of their pneumatic department. The company has had an experience of over 25 years in making air compressors, and furnishes them in various forms.

The catalogue contains 32 pages 6 × 9 in., and is illustrated. Some water-works which have been fitted with the air lift are described, and descriptions are also given of the methods and apparatus used.

The St. Louis Corliss Engines.—The St. Louis Iron & Machine Works, of St. Louis, Mo., has issued a third edition of its 30-page, 6×9 in. catalogue, descriptive of the "St. Louis Corliss" Engines. In the first half of the

catalogue many of the distinctive features of the more important parts of the engines are illustrated and described. This is followed by engravings of different views of the standard types of the engines made by the company, and by tables of dimensions for the use of purchasers. Attention is also called to the jet and surface condensers. A 400-H. P. engine direct connected to a 250 KW. generator is illustrated on page 27, and a list of purchasers is given on the last few pages.

TECHNICAL.

Manufacturing and Business.

The Geometric Drill Co. has removed its factory from New Haven to more adequate quarters at Westville, Conn.

The Cloud Steel Truck Co., of Chicago, Ill., has been incorporated by C. L. Sullivan, W. J. Dickenson, E. W. Rosenberg, W. E. Smith and Willard A. Smith, with a capital of $600,000, to manufacture and sell railroad materials.

The Fox Solid Pressed Steel Co., of Joliet, Ill., and the Fox Pressed Steel Co., of Pittsburgh, Pa., have been absorbed by the Fox Pressed Steel Equipment Co., with offices in the Havemeyer Building, 26 Cortlandt street, New York City.

The Philadelphia Roll & Machine Co., of Philadelphia, Pa., has been incorporated with a capital stock of $200,000. The Directors are: David Townsend, W. R. Wister, J. M. Bacon, F. P. Howe, Richard Ashurst, W. Wharton, Jr., and W. Selfridge.

At the annual meeting of the General Electric Co. at Schenectady, N. Y., May 11, the old Board of Directors was unanimously re-elected. Two hundred and ten thousand shares were represented.

The Lidgerwood Mfg. Co., New York City, recently received an order from its London representatives for three Ligerwood hoisting engines and boilers of the latest improved type. This makes 20 machines sold by the London branch since the first of the year.

The Stationers' Mfg. Co. (F. H. Bolton), of Detroit Mich., has established a Chicago branch at 269 Dearborn street for the sale of the Bolton patent coin wrappers and other bank and office specialties.

J. W. Duntley, President of the Chicago Pneumatic Tool Co., 635 Monadnock Block, Chicago, sailed for Europe May 19. He will visit England, Scotland, France, Russia, Austria, Germany, Norway and Sweden for the purpose of extending the foreign business of the company in pneumatic tools and machinery. The company has been obliged to double the capacity of its works in order to take care of increased business.

Henry L. Leach, of North Cambridge, Mass., reports sales during the month of April of 153 sets of the Leach sander for locomotives.

The Facer Solid Steel Car Wheel Co. has turned out at its works at Perth, Ont., a car wheel made from a solid steel ingot by a process invented by James A. Facer. About two years ago a similar wheel was made by Mr. Facer at Lewiston, Pa., and was exhibited at the annual conventions of the Master Car Builders' and Master Mechanics' associations at Alexandria Bay in June, 1895.

The plant of the Bushnell Mfg. Co. at Odenweldertown, Pa., is now running double time. Orders were recently received for furnishing car seats and fixtures for 50 cars for the Louisville Consolidated Electric Railway Co., 20 for the Milwaukee Traction Co., 10 for the Florence & Cripple Creek Railroad, four for the Philadelphia & Reading, four for the Cleveland & Lorain electric road, two for the Lake Shore & Michigan Southern, and for one funeral car for the Central Railroad of New Jersey, now being built at Elizabeth, N. J.

The works of the Berlin Iron Bridge Co., at East Berlin, Conn., are running full time and the company reports an encouraging spring business. In addition to a large number of orders for steel work for buildings, the company is at work on bridges for Charlemont, Mass.; Somerset County, N. J., Coventry, Conn.; Hermon, N. Y.; Vergennes, Vt.; large bridge for the S. D. Warren Co., at Cumberland Mills, Me., and highway bridge at Wilmington, N. Y.

The National Machinery Co., of Tiffin, O., recently received an order from the National Elastic Nut Co., of Milwaukee, Wis., for two nut-making machines. It is stated that with this additional machinery the National Elastic Nut Co. will be able to make over 30,000 nuts daily.

The New York Car Wheel Co., of Buffalo, N. Y., has received a contract to furnish 4,800 steel wheels for the 600 steel cars for the Pittsburgh, Bessemer & Lake Erie. They will weigh 700 lbs. each, and will be shipped in their rough state and finished at Allegheny. The axles are being made by the Carnegie Steel Co.

Orders have been issued by the Baltimore & Ohio for the removal of the company's shops from Martinsburg W. Va., to Cumberland, Md. Part of the machinery will be taken to Cumberland and the remainder to Mt. Clare. The Martinsburg shops employed 300 men. The move is in connection with the plan for concentrating all the shops and repair work of the eastern section of the road at Cumberland, the plant at that place being nearly completed.

The plant of the Lane Brothers Bridge & Construction Co. at Newark, O., is to be sold at Receiver's sale May 22.

The American Hoist & Derrick Co., of St. Paul, Minn., intends making additions to its plant. A new shop, 92 × 140 ft., of brick, stone and steel will be built and equipped with a 15-ton overhead traveling crane, a large boring mill and lathe and a number of slotting machines, electric drills and planers. A 60 × 90-ft. addition of brick and stone, with a steel roof, will also be built to the foundry. It will hold a cupola for reducing 20 tons of iron an hour, and an electric gib crane of 20 tons' capacity.

The New York Car Coupler Co., of 120 Liberty street, New York City, on May 18 made an assignment to William R Baird. The company was incorporated under the laws of West Virginia March 11, 1895, with a capital stock of $1,000,000. Walter F. Blaisdell is President, J. F. Palmer Secretary and George T. Whyte Treasurer.

The new addition to the plant of the Schoen Mfg. Co. at Allegheny, Pa., has been completed. It covers about five acres of ground, and nine large cranes, two lathes, a boring machine and wheel press have been installed. Work on the 600 steel cars for the Pittsburgh, Bessemer and Lake Erie will be begun June 1.

Iron and Steel.

The demand for iron and steel seems to be no better, with prices low. The sales of Bessemer iron last week aggregated 32,900 tons, against 12,000 tons for the preceding week. The blast furnace weekly production May 1 was 145 furnaces in blast, capacity 170,337 tons, a falling off, compared with April 1, of 4,799 tons. May 1, furnaces out of blast, 311; weekly capacity, 170,325 tons. The steel rail market is dull. Prices nominally $19 to $20.

The laborers of the Buhl steel mill, the Archman steel works and the American Steel Casting Co., at Sharon, Pa., have suffered a reduction in wages of 10 cents a day. Two hundred men are affected.

Puddlers in the Mahoning and Shenango valleys have refused to accept $4 for puddling. Their contract calls for $4 50 until July 1.

The Massillon, O., rolling mill has reduced puddling to $4 a ton.

The Illinois Steel Co. has, it is stated, purchased the season's supply of ore, 1,000,000 tons, with 300,000 tons of last year's contract undelivered.

No 7 Furnace of the Thomas Iron Co., at Lock Ridge, Pa., has been blown in.

No 3 Furnace of the E. & G. Brooke Iron Co., of Birdsboro, Pa., has been blown out.

The Shoenberger Steel Co. has placed one of its three new 35-ton open-hearth furnaces in operation. It is expected that the other two will be running within a short time.

The Secretary of War has awarded contracts to the Bethlehem Iron Co. and the Niles Tool Works, each for six 10-in. disappearing gun carriages, the Bethlehem Company to receive $15,500 each, and the Niles Tool Works $15,000 each.

The new structures now being built by the Derwent Foundry Co., at Ellwood City, will consist of a foundry and machine shop, 160×72 ft., and an enameling building, 160×60 ft.; both buildings to be entirely of brick and iron.

The Struthers Iron Co., of Cleveland, O., has banked its Struthers furnace, pending higher prices and a better demand.

The South steel mill of the Lackawanna Iron & Steel Co., at Scranton, Pa., resumed operations on May 17, after an idleness of several months. The mill was started on double time and it is expected that there will be a re-adjustment of tonnage and a reduction of the same averaging 12 per cent. Thirty-five hundred men were given employment by this resumption.

New Stations and Shops.

The new station which the Norfolk, Virginia Beach & Southern is building at Norfolk, Va., is expected to be completed soon. The building is 80 × 30 ft., and two stories high with broad platforms on all sides. It is being built by C. R. Parlett, contractor.

The Chicago, Burlington & Quincy has begun to rebuild its car shops at Plattsmouth, Neb., which were burned last Winter. The new buildings will be the same size as the old ones, but will be built of brick, with iron framing. Parts of the old buildings which were not totally destroyed will be used. It is expected that the work will be completed in about three months.

Interlocking.

The Union Switch & Signal Company is at present at work on the installation of a number of interlocking plants as follows.

At Mansfield, O., at the crossing of the Pittsburgh, Fort Wayne & Chicago, and the Baltimore & Ohio, a 24 lever machine with 19 working levers is being put in. At Forest, O., where the Pittsburgh, Fort Wayne & Chicago crosses the Cleveland, Cincinnati, Chicago & St. Louis, an interlocking plant is being erected having 18 working levers and six blank spaces.

A 12 lever machine is being installed at New Orleans at the crossing of the Louisville & Nashville and the New Orleans & Northeastern.

At the crossing of the Pittsburg, Fort Wayne & Chicago, Chicago & Calumet Terminal, Chicago, Hammond & Western, and the Michigan Central, at Calumet Park, near Chicago, an interlocking plant is being installed, having 72 working levers. An addition is being made to the present interlocking at Whiting, Ind., which will make the machine at that point 30 levers with no spare spaces. This change is necessary on account of the crossing of the Baltimore & Ohio by the Chicago & Calumet Terminal; the present plant merely operates the crossing of the Chicago and Calumet Terminal and the Lake Shore & Michigan Southern.

Chicago Drainage Channel.

The last report made by the Chief Engineer to the Board of Trustees of the Sanitary District of Chicago, shows the work done on the Drainage Channel up to March 31 of the present year to be as follows:

	Cu. yds. completed.	Cu. yds. remaining to be done.
Main channel glacial drift	23,543,685	2,695,373
Main channel solid rock..... ...	11,804,781	286,659
River diversion glacial drift....	1,156,596	.....
River diversion solid rock.....	228,918	.....
Retaining wall.....	339,795	29,550

The total value of all construction work done up to March 31 is $18,274,756, and the cost of the excavation remaining to be done is estimated at $1,081,287; at the time of making the report 92.22 per cent. of the main channel excavation was completed.

Test of Oil Burning Apparatus on the Illinois Central.

Mr. Wm. Renshaw, Superintendent of Machinery of the Illinois Central, has had an express suburban engine equipped to use oil for fuel, instead of hard coal, and a service test is to be made to determine the relative cost and efficiency of anthracite coal and oil in fast suburban service.

The engine is of the Forney type, with a two-wheel leading truck, and cylinders 17 in. × 24 in. The apparatus is patented by Mr. G. W. Prescott, and is now in use on about 40 engines of the Southern California, and is also used in the locomotive built for the Congress Gold Company by the Brooks Locomotive Works, which was illustrated in the *Railroad Gazette* Sept. 18, 1896.

Mr. C. F. Prescott superintended the application of the oil burners to the Illinois Central engine. The test was commenced May 12.

The Westinghouse-Lansberg Suit.

On May 6 the United States Circuit Court sitting at St. Louis rendered a decision in the case of the Westinghouse Air Brake Co. against the Lansberg Brake Co., of St. Louis. The suit was for infringement of the Westinghouse patent of March 28, 1887. The decision was in favor of Westinghouse and a perpetual injunction was issued against the Lansberg Company, restraining it from using its device during the life of the Westinghouse patent.

Steel Beam Pool Dissolved.

At a special meeting of the companies interested in the steel beam pool, which was organized 14 months ago, held at Philadelphia on May 13, the pool was dissolved, and an open market created. The companies represented at the meeting were Jones & Laughlins, the Carnegie Steel Co., the Pencoyd Iron Works Co., the Illinois Steel Co., the Phœnix Iron Co., the Passaic Rolling Mill Co., and the Pottsville Iron & Steel Co. At the time of the dissolution steel beams were rated in the Philadelphia market at $34 a ton.

Successful Test of Armor Plate.

A successful test of armor plate was made at the Indian Head proving grounds on May 15. The plate tested represented the casement armor for the battleships Kearsarge and Kentucky. It was 5 in. thick, and was made by the Carnegie Steel Co. Two 5 in. shells were fired, one with a velocity of 1,640 ft. a second and the other with a velocity of 1,758 ft. Both shells were broken in pieces against the plate, which was unharmed.

The Hardie Air Motor.

Sir A. B. Forwood, a large owner in the Liverpool, England, tramway system, before the city acquired the plant, has been for a considerable time making an investigation by direction of the Liverpool authorities for the purpose of report, of the working of the Hardie Air Motor on 125th street, New York. He employed as an expert, Mr. A. Thomson. The report which has been forwarded contains detailed description of the motors and plant now in use in New York, together with estimates of cost of their working. The report concludes as follows:

"Looking at this system from a mechanical point of view, there appears to be no doubt of its efficiency. The details connected with the service which we examined, have been very carefully wrought out and constructed, and the machinery appeared to have sustained no wear and tear of any moment after continuous service of about eight months.

"The arrangement of the machinery in the car is that of a plain simple engine, the working parts are of good strong section and design, and should last for a long time with a very little upkeep, and we have no hesitation in stating that a plant fitted upon this system, with the arrangements and details carried out properly to begin with, would work as great or greater efficiency and more economy than any other system which we are acquainted with."

THE SCRAP HEAP.

Notes.

President M. E Ingalls, of the Chesapeake & Ohio, who returned last week from Europe, says that he has arranged for the addition of three steamships to the fleet of the Chesapeake & Ohio Steamship Co., carrying grain and other freight from Newport News to Liverpool.

The show collision season has opened, or rather it tried to open, near St. Louis last week, but failed on account of a rain storm. The engines got steam up and the brass band was on hand, but the cloth fence enclosing the show grounds was blown down and the spectators, after getting their shoes well covered with mud, returned to the city.

A passenger train of the Southern Pacific was stopped by robbers near Lozier, Tex., at two o'clock in the morning of May 14, and the express safes were blown open with dynamite. It is said that the robbers got away with several thousand dollars. The express car was wrecked and the mail in it was damaged by the explosion. The train was held for over an hour.

Senator Harris, of Kansas, has introduced in Congress a bill converting the Interstate Commerce Commission into a court. It is proposed to have seven members and the country is divided into seven districts, each to be presided over by one of the members of the court. There is a clause permitting pooling, under the supervision of the proposed court; railroads submitting to the court a proposed pool must with it submit a complete tariff showing freight rates and classification which must be approved by the court before the pool can be approved.

The Supreme Court of New York, on application of the Attorney-General of the state, has summoned the presidents of a number of anthracite coal-carrying railroads to a hearing, to be held in Albany this week, to inquire into alleged violations of the anti-trust law, lately passed by the New York Legislature. The presidents summoned are Samuel Sloan, of the Delaware, Lackawanna & Western; Robert M. Olyphant, Delaware & Hudson Canal; Thomas P. Fowler, New York, Ontario & Western; J. Rogers Maxwell, Central of New Jersey; Joseph S. Harris, Philadelphia & Reading, and Elisha P. Wilbur, Lehigh Valley.

The Humphreys street railroad bill, which has been hotly contested in the Illinois Legislature for several weeks, has been rejected, the final vote in the House of Representatives being 123 to 29. This bill proposed to place the control of street railroads in the hands of state commissioners instead of the municipal authorities, and extended for 50 years the franchises of all existing street railroads. The Senate had passed the bill, but the newspapers and the civic reform organizations of Chicago opposed it furiously, and the majority against it in the lower house was unexpectedly large. In Chicago mass meetings were held, and the names of the Senators who had voted for the bill were placarded for everlasting political damnation."

Brazilian Government Railroad Leases.

The time within which proposals will be received for leasing the government railroads of Brazil has been extended from May 15 to Sept 9 next. Tenders will be received up to the latter date by General Director Joguim Maria Machado de Assio at the General Traffic Department of the Ministry of Industry, Traffic and Public Works, and at the Brazilian Legations in Paris, London, Berlin, Brussels and Washington. The lease is to extend 60 years, but the government reserves the right to annul the same after the first 30 years. The roads to be leased aggregate about 1,800 miles, and were named in our issue of Feb. 12, 1897.

The St. Louis Terminal Cupples Station.

Messrs. J. & W. Seligman & Co. announce an issue of $3,000,000 first mortgage 4½ per cent. gold bonds for the St. Louis Terminal Cupples Station & Property Co. These bonds are dated June 1, 1897, and will run for 20 years, but will be redeemable after June 1, 1902, at 102 and accrued interest. They are in denominations of $1,000 and $500, and coupons are payable on June 1 and Dec. 1 of each year. The property to be mortgaged has been appraised by the Anderson Wade Realty Co., at $4,584,638. The Cupples Station, which was described in the *Railroad Gazette* on July 10, 1891, and has since been referred to on Nov. 30, 1894, and Feb. 12, 1897, consists of a series of large seven-story warehouses, built at the entrance of the Terminal Railroad Association's tunnel in St. Louis. Mr. R. S. Brookings, President of the company, states that in addition to the Cupples Station buildings proper a number of other wholesale buildings in its vicinity are included under the mortgage; of these, two are still in course of erection. The Terminal Railroad Association of St. Louis is under perpetual contract with this company to maintain a freight station on these premises. Mr. Brookings further states that the bonds now issued by the St. Louis Terminal Cupples Station & Property Co. form an absolute first lien upon the lands, buildings, tracks and easements which are cited in the trust deed.

A Railroad Accident.

The Wisconsin & Michigan Railroad, a part of whose line is on Lake Michigan, in the shape of a car-ferry, seems to be subject in some respects to the same difficulties that other roads have to contend with. During a storm on a dark night recently, a train—that is, a tug with a number of barges—broke in two; and the rear portion, instead of running into the forward one, as is the habit of cars when running on dry land, stopped and loafed around according to its own sweet will. Some time after daylight the next morning the stray barge was discovered, near Racine, with four of its cars gone and another hanging over the stern of the vessel. The hind-end man was, we suppose, suspended for 30 days, for not putting on the brakes, as required by Rule 403.

Lake Notes.

Some record breaking cargoes have been carried by the new steel ships in the Lake Superior trade. Last week the Watt carried to Duluth 5,500 tons of coal, the largest amount ever brought up the lakes, and with it 270 tons more as fuel. The Queen City, that has successfully held the cargo record for two years, took out 5,463½ tons of grain, while the Carnegie followed with only 3½ tons less. The Crescent City carried out 256,613 bu. of coarse grain, weighing 4,978 tons.

At the opening of navigation there were on docks at Houghton County, Mich., more than $4,500,000 worth of ingot and barrel copper for shipment East and export.

Improvements will be be made at Milwaukee by the Milwaukee Drydock Co., to enable it to compete for the construction of steel ships. The yard has done no building for several years.

Railroad Property in the Courts.

A case decided by the Supreme Court some months since, that of Covington & Lexington Turnpike Road Company vs. Sandford, reported in United States Supreme Court Opinions No. 5, page 199, is of interest in comparison with the Trans-Missouri case. It relates to ordinary local business within state boundaries, but the two together present a pretty good view of the legal theory of property invested in the business of transportation held by the Supreme Court as at present constituted.

The Kentucky Legislature in 1890 fixed maximum rates for the turnpike company. The company announced its intention to disobey the law, and Sandford and other farmers living along the road, and accustomed to use it every day, brought a suit to enjoin the company from charging more than the rates allowed by the law. The state courts granted a perpetual injunction. The Supreme Court on appeal considered the claim that if the law should be obeyed, the road could not earn any dividends, and that the stockholders were thus deprived of property without "due process of law." The company insisted that it was only earning about four per cent., while extraordinary anticipated expenses would cut the income down to nothing. It also set our facts relating to competition, grades, etc., all tending to show that under the act, the road would not be able to pay its ordinary expenses. The facts were admitted by the complainants, and the road demurred. . . .

The Court does not decide that the Kentucky turnpike rate law was unconstitutional merely because the company could not earn more than four per cent. It does not say that a corporation operating a public highway is entitled, without reference to the interest of the public, to earn four or any other given per cent. on its stock. An inquiry must be made as to what is fair and reasonable to both sides. If the establishment of railways, for instance, leads to the disuse of turnpikes, that is not in itself a sufficient reason why rates should be put up to an unreasonable point. "The right of the public to use the plaintiffs' turnpike upon payment of such tolls as in view of the nature and value of the service rendered by the company are reasonable is an element in the general inquiry whether the rates established by law are unjust and unreasonable. That inquiry also involves other considerations—such, for instance, as the reasonable cost of maintaining the road in good condition for public use and the amount that may have been really and necessarily invested in the enterprise. The court must take into consideration the interests both of the public and the owner of the property, together with all other circumstances that are fairly to be considered in determining whether the legislature has, under the guise of regulating rates, exceeded its constitutional authority and practically deprived the owner of property without due process of law. What those other circumstance may be it is not necessary now to decide. That can be best done after the parties have made their proofs."

This makes the question whether a state legislative or commission tariff confiscates or does not confiscate depend wholly on the reasonableness of the rates. Now contrast this with the Trans Missouri decision, in which it was held that Congress may make illegal and even criminal any contract between railroads which renders rates stable, even though it be reasonable. That is, Congress under a limited grant from the states themselves has a more absolute power over interstate contracts than a state legislature can get over state contracts. What sort of property is this which state legislatures must deal with reasonably or not at all, but the reasonable management of which, if it comes within the scope of Congressional authority, may be punished by fine and imprisonment as a criminal offense?—*New York Evening Post.*

The Launch of a Caisson for the New East River Bridge.

After an unsuccessful attempt, on the afternoon of May 13, to launch the first caisson built for the New East River Bridge, the structure was successfully floated from the ways in the yards at the foot of North Second street, Williamsburg, on Saturday morning, two days later. It was then towed across the river to the foot of Delancy street, where it will be sunk for building the foundations of one of the piers for the New York tower of the bridge. The caisson weighs about 1,100 tons, and measures 76 × 60 ft. It is 19 ft. high, and is surrounded by a cofferdam which adds 12 ft. more to its height.

Railroad Disaster in Russia.

A press despatch from St. Petersburg, May 14, says that in the derailment of a military train betwen Rockenhof and Eliva, on the Valki-Jurjev line, sixteen cars were wrecked, two officers and 54 soldiers killed and 90 others seriously injured. The derailment was on a low embankment which had been submerged and undermined by floods. The train was conveying the Krasnojarsk infantry. The engine first toppled over, dragging with it 15 covered trucks filled with soldiers, and two second-class carriages. In the panic which followed the accident, many of the soldiers jumped into the water and were drowned.

Chinese Railroads.

The extension of the Imperial Chinese Railways from Tien-Tsin to Peking was formally opened April 19 by Prince Kung.

Section 7 of the Boston Subway.

The Shailer & Schniglau Co. has secured the contract for building section 7 of the Boston Subway, including the station at Scollay Square, the bid amounting to $99,690. The other competitors and the amounts of their estimates were as follows: George W. Judd, $140,515; E. W. Everson, $108,395; National Contracting Company, $104,950

The Aluminum Industry.

A recent report to the State Department relative to the aluminum production in the different countries gives the horse-power used and the daily capacity of each plant as follows. We have corrected the report materially from private information.

	Horse-power.	Average daily capacity, pounds.
United States:		
Pittsburgh Reduction Co. Works at Kensington, Pa.	1,600	2,000
Works at Niagara Falls, N. Y.	6,500	10,000
Switzerland:		
Works at Neuhausen	4,000	6,000 to 7,000
France:		
Works at Lapraz	2,500	5,000
Works at St. Michael	2,000	5,000
Total	16,600	28,000 to 29,000

In Great Britain the British Aluminum Co. has bought the Irish bauxite pits for the purpose of making aluminum at Larne Harbor, near Belfast. The same company has bought water rights at Foyer's Falls, Scotland, where 4,000 H. P. is at its disposition. The new addition to the Neuhausen works, which is to be worked by the Heroult system, will add about 6,000 lbs. to its daily production. A German-American syndicate has projected works at the Falls of Sarpfoss, in Norway, where it is estimated 10,000 H. P. can be obtained.

Further, the Neuhausen Company is building new works at Rheinfelden, Switzerland, and has also bought water rights at Lend, near Gastein, Austria.

These new additions (Rheinfelden, 6,000 H. P.; Foyer's Falls, 3,000 H. P.; Sarpfoss Falls, 5,000 H. P.), as well as the increased horse-power projected for the plants now in existence; Niagara Falls' increase of 7,100 H. P., St. Michael, 4,000 H. P., will in 1898, with an aggregate for all the plants of 33,000 H. P., be able to turn out an average of 42,500 lbs. daily.

American Steel in England.

The nature of the competition which our steel makers are now offering for the British steel trade is set out in an article prepared by an expert for publication in London and transmitted to the Department of State by United States Consul Parker at Birmingham. The expert shows that England is threatened in her supremacy by two conditions: First, the exhaustion of her own ores and of the cheap foreign ores she has been so largely using; and, second, the rapid growth of American competition. Consul Parker directs special attention to the means that have enabled our steel men to bring their ores 600 to 800 miles to the blast furnaces, carrying the finished product 500 miles from the interior to tidewater at New York and thence transport it a distance of 3,200 miles by sea and compete with British steel. The expert believes that the most remarkable of these means is the gigantic scale upon which American iron making plants are built and operated.

Compressed Air on the Terror.

The use of compressed air as a motive power on a warship presents several advantages over steam or hydraulic power, which render it a powerful competitor. As compared with steam, it is less dangerous, especially during an action, when a broken steam pipe might prove terribly fatal, and it enables certain parts of the ship to be kept at an even temperature, which would otherwise be rendered uncomfortably hot by the presence of steam piping. Steam and hydraulic engines, moreover, require exhaust pipes discharging outside the hull of the ship; whereas the exhaust from the pneumatic cylinders may be turned into the ship or into the outside air, as may be most convenient. There are certain localities in a ship where the exhaust from a pneumatic engine would prove a valuable source of ventilation, as, for instance, in a turret crowded with men and machinery, or in the close confinement of a steering-room situated below the protective deck. As compared with hydraulic power, the compressed air system is cleaner and more convenient, and free from the discomfort that arises from the leaking of hydraulic pipes and cylinders. There is immunity from freezing. Leakage is not attended with increase of temperature, as with steam; or flooding of the compartment, as with the hydraulic system. There is less danger of break-downs when starting up or stopping motors suddenly than in the other systems.

The U. S. monitor Terror is the first vessel to be equipped with pneumatic steering engines and pneumatic operation of turrets. The recent tests were highly satisfactory. The air is compressed by two separate engines. The working pressure is 125 lbs. per square inch, and there is no reservoir for the air except an 8-in. pipe, which runs through the vessel and supplies the two turrets and also the steering device in the steering-room at the extreme after end of the ship. These two engines supply sufficient air for turning the turrets, elevating the guns, lifting the ammunition into the cages, raising the cages to the breech of the gun, ramming home the charge, closing the breech, checking the recoil, and lastly, and most important operation of all, steering the ship itself.—*Scientific American.*

LOCOMOTIVE BUILDING.

The Baldwin Locomotive Works is building one locomotive for the Oahu Railroad & Land Co., of Hawaii.

The Rogers Locomotive Co., of Paterson, N. J., has about completed one 6-wheel passenger and four consolidation locomotives for the state railroads of Chili.

The Boise, Nampa & Owyhee Railroad recently received two consolidation locomotives, one each from the Baldwin Locomotive Works and Pittsburgh Locomotive Works. The former has 20 × 26-in. cylinders and 50-in. drivers with tender, capacity six tons of coal and 2,800 gals. of water. The latter has 18 × 24 in. cylinders, 50-in. drivers and Bissell truck. The capacity of the tender tank is 2,700 gals.

CAR BUILDING.

The Canada Atlantic is in the market for 250 box cars.

The St. Charles Car Co. has received an order to build 50 cars for the Waters-Pierce Oil Co.

The Wells & French Co., of Chicago, is building 200 fruit cars for the California Fruit Express.

The Baltimore & Ohio has placed an order with the Michigan-Peninsular Car Co. for 500 coal cars.

It is stated that the Boston & Maine has placed an order with the Pullman Palace Car Co. for 10 passenger cars.

In addition to the six cars referred to in our issue of April 30, the Wason Mfg. Co. is building for the Spokane Falls & Northern, 35 flat, 35 box and four refrigerator cars.

The Pullman Palace Car Co. is building three passenger cars and one combination passenger and baggage car for the San Francisco & San Joaquin Valley Railroad, in addition to the 50 stock cars referred to last week.

The Consolidated Traction Co., of Pittsburgh, Pa., has awarded a contract to the Laclede Car Co. for 100 motor cars.

BRIDGE BUILDING.

Allentown, Pa.—Plans for a bridge across the Jordan, in Lowhill Township, are being prepared by Lehr & Martz.

Anne Arundel, Md.—The Anne Arundel County Commissioners have contracted with the Youngstown Bridge Co. for a steel drawbridge across the Severn River for $2,394.

Bonne Terre, Mo.—The Mississippi River & Bonne Terre, it is said, will build three new steel bridges during the coming season, taking the places of the wooden structures now spanning Big River, at both the north and south crossings, and also the St. Francois, near Doe Run. J. Burns, Gen. Supt.

Canton, O.—Bids are wanted for a 132-ft. span iron bridge, over the Tuscarawas River, in Jackson Township. W. M. Reed, County Auditor.

Clearfield, Pa.—The Grand Jury has recommended the building of a bridge at Burnside.

Columbus, O.—Bids are asked May 27 for the steel work of a bridge on the Harrisburg Pike over Big Run, and also for a bridge and approaches on the Jackson Pike. P. H. Halliday, County Auditor.

Fitchburg, Mass.—It is the intention of the city to widen Mt. Auburn street, and as the bridge over the railroad comes within the improvement it is a question whether or not it should be entirely rebuilt and made to conform with the regulation height of 18 ft., or be allowed to re main as it is. The Railroad Commission has arranged for another meeting on June 9, when the matter will be further considered.

Maquapit Lake, N. B.—A new bridge will be built across the river here to replace the one which was recently carried away by the floods.

Mercer, Pa.—The Commissioners of Mercer County will receive bids until June 10 for five iron bridges from 35 to 180 ft. in length.

Middleboro, Mass.—The Grade Crossing Commissioners have had a hearing on the proposition to abolish the Centre, Main and Grove street crossings and announced that they will have another on May 29.

New York, N. Y.—Governor Black has signed bills allowing the New East River Bridge Commission to take immediate possession of property which it condemns before fixing the price for the same; allowing the Commission to make the same kind of leases that the old East River Bridge Commission had the power to make; and changing the plan of the Brooklyn approach so as to straighten out the curve at South Fifth street.

Omaha, Neb.—It is announced that the Union Pacific will build four new iron and steel bridges. Work is now in progress on two of these and will soon be begun on the others. G. H. Pegram, Chief Engineer.

Slatington, Pa.—It is proposed to span the gully between Main and Church streets with an iron bridge, the Grand Jury having reported favorably upon the matter, and the project is now in the hands of the Court. The County Commissioners state that they are financially able to build the bridge this year, but the Court has expressed the opinion that the structure would cost more than the estimate, $10,000. The bridge is to be 300 ft. long, with a roadway 18 ft. wide and a walk 8 ft. wide on each side.

Wilmington, Del.—Plans for a 70-ft. steel girder bridge are being prepared by the Baltimore & Ohio.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is decided that it is no objection to the imposition of a state tax upon railroad rolling stock used partly within the state that the same is engaged as a vehicle of interstate commerce, or that its legal situs is in another state or territory, where taxes on it have been paid.[1]

In Alabama the imposition by a city of a license tax on railroad companies whose lines extend through it, and which have places of business therein, is not an interference with interstate commerce.[2]

In the Federal Court it is ruled that liquors imported by a common carrier from another state, for the personal use of the importer, are under the protection of the interstate commerce law only so long as such personal use continues, and such protection ceases if the liquors are given to another.[3]

In North Carolina it is decided that the statute making it a misdemeanor to run railroad trains (with certain exceptions) between certain hours on Sunday, is not unconstitutional as applied to trains carrying freight between points in different states.[4]

In the Federal Court it is laid down that subject to the two prohibitions that their charges shall not be unjust or unreasonable, and that they shall not unjustly discriminate, the act to regulate commerce leaves common carriers free to make special contracts looking to the increase of their business to classify their traffic, to adjust and apportion their rates so as to meet the necessities of commerce, and, generally, to manage their interests upon business principles; there being no power vested in the commission to prescribe maximum rates for the transportation of freight.[5]

In Pennsylvania it is held by the Supreme Court that a judgment for an assessment for a street improvement against the coal yard and ore terminal of a railroad company should not be denied, as the purchaser would take the land subject to the easement on the part of the company for the roadbed running through the yard necessary to the existence of the company as a common carrier, which was not subject to assessment.[6]

In Iowa it is decided that one who had made shipments for a number of years over a railroad, paid the freight bills presented therefor, and accepted receipts which recited the weight of the shipments, was not estopped from showing that the weight was less than that stated in such receipts.[7]

Injuries to Passengers, Employees and Strangers.

In Oklahoma it is decided that since a railroad is not required to stop every train at every intermediate station, and one proposing to travel is bound to inform himself whether the train on which he takes passage is to stop at his destination, a passenger holding a ticket for a station at which the train does not stop, who refuses to pay fare to the next station beyond at which the train does stop, may be ejected before he reaches his station.[8]

In Centucky it is held that a trespasser, who was injured while trying to climb upon a car in a slowly-moving freight train, which he was prevented from doing by a brakeman, cannot recover damages from the railroad company, unless the injury was caused by the use of unnecessary force by the brakeman.[9]

In Missouri defendant's freight train, on which plaintiff was braking, was wrecked. Two wheels of the engine were derailed, and the car next to the engine was broken in two, the sills of the car were rotten, and their defective condition could have been discovered by proper inspection. The testimony was conflicting as to the cause of the wreck. The engineer heard a crash behind him, and one of the brakemen saw the car go down and the others pile upon it. A brakeman testified that the car was sound when it went off the track and broke afterward. The Supreme Court rules that it was for the jury to determine whether the wreck was caused by the train leaving the track or by the breaking of the defective car.[10]

In Utah a switchman who steps between moving cars for the purpose of uncoupling them is not guilty of contributory negligence as a matter of law.[11]

In Kansas it is held that a yard clerk, injured while riding on a switch engine in violation of a rule of the company, could recover, where the rule had long been habitually violated with the knowledge and approval of the company's managing officers.[12]

In Indiana, in an action for personal injuries resulting from the explosion of a locomotive boiler, the special verdict showed that at the time of the explosion there were 45 broken bolts in the fire sheet, which gave no support or strength to the boiler, thereby rendering it unable to resist the pressure of steam and dangerous; and that the explosion occurred in that part of the boiler where such bolts were located. The Supreme Court rules that it was no objection that the verdict did not find specifically that the explosion was the result of said defects.[13]

In the Federal Court a switchman in a railroad yard was injured in uncoupling cars by reason of a defect undiscovered by him in one of the cars. Having sued the company for damages, the defendant asked the Court to instruct the jury that, if they found it was the custom of defendant to inspect or repair cars brought, as these were, upon its road, to be loaded and returned, and if plaintiff knew this custom, or could have known it by the exercise of ordinary care, then he assumed the risk of any defects therein. The Trial Court gave the charge after striking out the words, "or could have known it by the exercise of ordinary care." The Appellate Court holds that there was no error in striking out these words.[14]

In Kentucky an action to recover for the killing of plaintiff's decedent, the evidence showed that it was the duty of deceased, as conductor, to aid in coupling when necessary: that it was customary to stand on the pilot of the engine when coupling it to a car; that the fireman, who was acting as engineer, attempted to reverse the engine as it approached the car, but failed, owing to the defective condition of the air-brake and the absence of sand in the box; that the speed was so rapid that deceased, who was on the pilot, failed to make the coupling, and was fatally injured; that the engine was in general bad repute; that it was the engineer's duty to turn it into the shop on Saturday nights and report its condition, whereupon a certain officer would have the necessary repairs made, and that the engine was in the shop the Saturday night before the accident. The Supreme Court held the railroad liable.[15]

In Kansas it is ruled that the maintenance of a switch-stand, on the top of which is an arrow 17 in. long, which, when turned towards the track, is so close as to knock trainmen from the ladder on the side of the car while engaged in their duties, is negligence on the part of the railroad company, warranting the submission to the jury of the question of gross negligence.[16]

In Missouri the Supreme Court rules that an ordinance requiring a railroad to station watchmen at certain crossings, to protect persons about to cross the tracks "at any such crossing," is not admissible in an action for an injury received at a point several hundred feet from one of the designated crossings.[17]

In the same case it is held that evidence that plaintiff, a bright boy, nine years old, familiar with the movement of trains in the locality where he was hurt, stood beside the railroad track as a train passed, having one end of a string attached to his wrist, and the other to a piece of ice on the opposite side of the track, and that the engine struck the string so as to throw plaintiff down, conclusively shows contributory negligence.

[1] Reinhart v. McDonald, 76 Fed. Rep., 403.
[2] Anniston v. So. Ry., South. Rep., 915.
[3] Donald v. Scott, 76 Fed. Rep., 559.
[4] State v. Southern Ry., 25 S. Rep., 862.
[5] Interstate Com. Com. v. C., N. O. & T. P. Co., 76 Fed. Rep., 183.
[6] Philadelphia v. P. & R., 35 Al. Rep., 610.
[7] Higley v. B., C. R. & N. 68 N. W., Rep. 829.
[8] Noble v. A., T. & S. F., 46 Pac. Rep., 483.
[9] L. & N. v. Cernard, 37 S. W. Rep., 841.
[10] Oglesby v. M. P. Co., 37 S. W. Rep., 829.
[11] Wright v. South. Pac. Co., 46 Pac. Rep., 374.
[12] A., T. & S. F. v. Slattery, 46 Pac. Rep., 941.
[13] L., N. A. & C. v Lynch, 44 N. E. Rep., 997.
[14] T. & P. Ry. Co. v. Archibald, 75 Fed. Rep., 802.
[15] Judd v. C. & O., 37 S. W. Rep., 842.
[16] S. K. v. Michaels, 46 Pac. Rep., 938.
[17] Spillane v. M. P., 37 S. W. Rep., 198.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Mexican Northern, quarterly, 1 per cent., payable June 2.

North Pennsylvania, quarterly, 2 per cent., payable May 25.

Third Avenue, N. Y., quarterly, 2 per cent., payable May 28.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 25.

Chateaugay, annual, Plattsburgh, N. Y., May 29.

Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 5.

Delaware, Maryland & Virginia, annual, Georgetown, Del., May 26.

Des Moines & Fort Dodge, annual, Des Moines, Ia., June 3.

Mexican Northern annual, 42 Pine street, New York, June 1.

New York Central & Hudson River, special, Albany, N. Y., May 26.

Northern (New Hampshire), annual, Concord, N. H., May 27.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Mechanical Engineers* will hold its semi-annual meeting at Hartford, Conn., May 25 to 28. For programme see issue of May 7.

The *Association of American Railway Accounting Officers* will hold a convention at Richmond, Va., on May 26, 1897.

The *Association of Railroad Claim Agents* will hold their next meeting at the Southern Hotel, St. Louis, May 26, 1897.

The *Association of Railway Claim Agents* will hold its convention at St. Louis, Mo., during the last week of May, 1897.

The *Canadian Electrical Association* will hold its convention at Niagara Falls, Ont., June 2, 3 and 4. Hotel Lafayette will be the headquarters of the association.

The *Master Car Builders' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 8, 1897.

The *National Association of Local Freight Agents' Associations* will hold a convention at Washington, D. C., on June 8, 1897.

The *American Railway Master Mechanics' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 15, 1897.

The *National Association of Car Service Managers* will hold a convention at Boston, Mass., on June 16, 1897.

The *Association of Railway Telegraph Superintendents* will hold a convention at Niagara Falls, N. Y., on June 16, 1897.

The *Ohio State Tramway Association* will hold its next meeting at Columbus, O., on June 15.

The *Train Despatchers' Association of America* will hold its tenth annual convention at Detroit, Mich., on June 22, 1897.

The *American Society of Railroad Superintendents* will hold its next meeting at Nashville, Tenn., beginning Sept. 22.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 25 East Eighth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Engineers' Club of Columbus*, (*O.*), meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736-1739 Monadnock Block, Chicago.

American Ticket Brokers' Association.

This Association held a convention at Pittsburgh May 12 and 13. The President of the Association is John M. Kinner, of Cleveland, and the Secretary, W. B. Carter Louisville, Ky.

Special Agents' Association.

"The Railway Special Agents' Association of the United States and Canada," which means, we suppose, an association of detectives or secret service men, held a meeting in St. Louis May 12. The President of the Association is W. S. Canada, Union Pacific, and the Secretary J. J. Kinney, A. T. & S. F.

Western Railway Club.

At a meeting of the club at Chicago, May 18, officers were elected as follows: President, F. A. Delano; First Vice-President, E. M. Herr; Second Vice-President, W. F. M. Goss; Treasurer, J. W. Cloud; Secretary, G. M. Basford, and Director P. H. Peck. William Forsyth, F. W. Sargent and A. M. Waitt were chosen a Library Committee.

Civil Engineers' Club of Cleveland.

At the last regular meeting of the club at Cleveland, O., Tuesday evening, May 11, a paper by Mr. Walter Miller on "Some Notes on Marine Engineering and Shipbuilding in England, Scotland and Ireland" was read. It was a very complete collection of notes describing observations by the reader during his recent trip through the shipbuilding yards and machine shops and foundries of those countries. An interesting discussion followed.

New York Railroad Club.

A regular meeting of the New York Railroad Club was held at the rooms of the American Society of Mechanical Engineers, in New York City, on Thursday evening, April 15, with 105 members present. The entire meeting was devoted to the report of the Committee on the Master Car Builders' Rules of Interchange. This report was read by paragraphs, each being discussed as read.

At a meeting of the Club held on May 20, in Mendelssohn Hall, New York City, a paper was presented by Mr. F. R. Coates on "The Conditions Which Influence the Life of Track."

The Railway Signalling Club.

A meeting of the Railway Signaling Club was held at the Great Northern Hotel, Chicago, Tuesday evening, May 11. The committee on "Interlocking Rules," H. D. Miles, W. C. Nixon and H. M. Sperry, presented a report which was accepted, and the secretary was instructed to have 1,000 copies printed for distribution. The discussion of the paper, "Signal Problems," by Mr. Sperry, was laid over until the next meeting. A committee was appointed to design a suitable badge for the use of members of the club. The next meeting will be held Sept. 14. The place of meeting on this occasion will quite likely be New York, but this has not as yet been definitely decided upon. A meeting there is proposed with a view to bringing together the eastern members.

The Franklin Institute.

At the stated meeting of April 21 ult., it was voted to continue the discussion of "The Smoke Nuisance and its Regulation" at the stated meeting of May 19. A number of engineers and experts, local and non-resident, who were prevented from presenting their views at the April meeting, will be heard from at the meeting in May. Mr. Outerbridge will close the discussion.

Lieut. Geo. O. Squier, U. S. A., Fort Monroe, Va., by special invitation, will present a communication on "The Synchronograph," a new method of rapidly transmitting intelligence.

On the Tuesday, May 25, 8 p. m. meeting of the Electrical Section, there will be a paper on Electric Elevators, by Mr. Joseph Sachs, of New York; also an exhibition of and discussion upon Rheostats. Discussion opened by Mr. C. E. Carpenter, of the Ward Leonard Electrical Co., New York.

American Society of Civil Engineers.

A preliminary circular is issued conberning the annual convention of 1897. The convention will be held at Quebec. The headquarters of the society will be at Château Frontenac, and the first session will be held on the morning of June 30, the convention continuing through July 1 and 2. A special train will leave New York June 28, and run via the Adirondack Division of the New York Central & Hudson River to Montreal, where the party will make the Windsor Hotel its headquarters. The morning of the following day, June 29, will be spent at Montreal, and at 14 o'clock a special train, provided by the Canadian Pacific, will carry the party to Quebec, arriving there in time for dinner. It has been suggested by members residing at that place that Niagara Falls would be a convenient rendezvous for many who propose to attend the convention, and, if warranted, special arrangements can be subsequently made for transportation to Quebec. There will be no charge for transportation on the special train from Montreal to Quebec.

The New England Railroad Club.

The New England Railroad Club held its regular meeting on Tuesday of last week. In the afternoon the members were taken on a tour of inspection through the subway, which was supplemented by an illustrated lecture in the evening by President G. G. Crocker, of the Transit Commission. He reviewed the progress of railroading, and called attention to the fact that in less than 10 years there have sprung up in the state of Massachusetts 1,000 miles of railroads operated by electricity. He made a statement of the comparative merits of elevated roads and subways for city travel, summing up the expense item by saying that while the great expense of the former lay in the property destroyed, that of the latter was purely in cost of construction. At the end of his lecture he produced two views of Tremont street, one showing it as it will appear when the subway is completed and the tracks are removed, the other as it would appear with an elevated road, showing the tracks and a locomotive in the background. After the reading, a report on the rules for exchange of freight cars and some discussion thereon, the members were treated to a collation, and the club adjourned until September.

PERSONAL.

—Mr. F. Sweet has been appointed Traveling Freight and Passenger Agent for the Colorado Midland, with headquarters at Salt Lake City.

—Mr. H. M. Carr, General Agent of the Milwaukee & Michigan Fast Freight Line, at Milwaukee, Wis., died at his home in that city on May 18.

—Mr. C. P. Rector, Commercial Freight and Passenger Agent of the St. Louis Southwestern, at Memphis, Tenn., died at his home in Memphis on May 12.

—Mr. J. M. Whitman, General Manager of the Chicago & Northwestern, will sail for Europe the latter part of May for a three months' vacation.

—Mr. W. S. Nevins has been appointed Traveling Freight Agent of the St. Paul, Minneapolis & Sault Ste. Marie, with headquarters at Buffalo, N. Y.

—Mr. F. Zimmerman has been appointed Chief Clerk to the General Traffic Manager of the Michigan Central at Detroit, Mich., to succeed Mr. J. M. Black, deceased.

—Mr. H. P. Hughes has been appointed Traveling Passenger Agent of the Texas & Pacific, with headquarters at Dallas, Tex., to succeed Mr. W. A. Dashiell, resigned.

—Mr. Edward Sands, who recently resigned as New England Passenger and Freight Agent of the Plant System, died of pneumonia at his home in Newton, Mass., May 15.

—Mr. James Harrington has been appointed Superintendent of the Little Rock & Memphis, with headquarters at Memphis, Tenn., to succeed Mr. A. Gordon Jones, resigned.

—Mr. George F. McKay has been appointed General Manager of the Erie Despatch, with headquarters in Cleveland, O., to succeed Mr. A. S. White, resigned to enter other business.

—Mr. P. E. Garrison, formerly Division Master Mechanic of the West Shore, at East Buffalo, N. Y., has been appointed Assistant Superintendent of Motive Power of the same road.

—Mr. S. K. Hooper has been appointed Traveling Freight and Passenger Agent for the New York, Chicago & St. Louis, with headquarters at Salt Lake City. This is a newly created office.

—Mr. C. H. Marshall has been appointed General Eastern Agent of the Union Pacific, Denver & Gulf, and the Fort Worth & Denver City, with headquarters at 377 Broadway, New York City.

—Mr. R. T. Dalton has been appointed Trainmaster of the Fourth and Fifth Districts of the Eastern Division of the Grand Trunk, with headquarters at Montreal. The office is a newly created one.

Mr. J. A. Droege has been appointed Trainmaster of the Southern, with headquarters at Columbia, S. C., to succeed Mr. L. A. Boyd, who recently resigned to accept a similar position with the Seaboard Air line.

—Mr. B. F. Masson, Traveling Passenger Agent of the Cincinnati, Hamilton & Dayton, at Toledo, O., has resigned to take service with the Detroit & Cleveland Steam Navigation Co., with headquarters at Toledo.

—Mr. A. P. Barnard, Claim Agent for the Omaha & St. Louis, with headquarters at Omaha, Neb., died at his home in that city on May 5. Mr. Barnard was a brother of J. F. Barnard, Receiver of the Omaha & St. Louis.

—Mr. J. A. Rasbeck has been appointed Superintendent of the Cheyenne & Northern Division of the Union Pacific, Denver & Gulf, with headquarters at Cheyenne, Wyo., to succeed Mr. T. H. Fitzpatrick, resigned.

—The new Railroad Commission of Tennessee has organized by the election of E. L. Bullock as Chairman. The other two members are N. H. White and Frank Thompson. The Secretary of the Commission is DeLong Rice and the office is at Nashville.

—Mr. E. S. Tompkins has been appointed Assistant to Mr. A. J. Vanlandingham, who was recently appointed Commissioner of the St. Louis Transportation Bureau. Mr. Tompkins has been in the employ of the Atchison, Topeka & Santa Fe at Kansas City.

—Mr. D. C. MacWatters, District Passenger Agent of the Pennsylvania Lines West of Pittsburgh, with headquarters at Pittsburgh, Pa., has resigned, and the office has been placed temporarily in charge of Mr. Samuel Moody, Assistant General Passenger Agent at that place.

—Mr. Joseph Bowles, who for the past seven years has been Chief Clerk in the office of the General Western Passenger Agent of the Chicago & Alton, at St. Louis, has been appointed Traveling Passenger Agent of the New York, Chicago & St. Louis, with headquarters at Dubuque, Iowa.

—Mr. Thomas Thatcher, of Yarmouth Port, Mass., died in New York City on May 15. Mr. Thatcher was appointed Receiver of the Missouri, Iowa & Nebraska in July, 1885, and held that office until the road was sold under foreclosure the following year and reorganized as the Keokuk & Western.

—Mr. T. C. Wallace, formerly connected with the General Passenger Office of the Union Pacific at Omaha, Neb., has been appointed Traveling Passenger Agent of that road, with headquarters at Indianapolis, Ind., to succeed Mr. A. J. Ratcliff, who was recently transferred to Salt Lake City.

—Mr. E. P. Turner, formerly City Passenger Agent of the Texas & Pacific, at Dallas, Tex., has been appointed General Passenger and Ticket Agent of that road, with headquarters at Dallas, to succeed Mr. Gaston Meslier, resigned. Mr. Turner has been in the service of the Texas & Pacific for the last 18 years.

—Mr. A. H. Pape, formerly Agent in Cincinnati for the Kanawha Despatch, has been appointed General Agent of the Chesapeake & Ohio, with headquarters at Cincinnati. Mr. S. Hemstead, formerly Soliciting Agent for the Kanawha Despatch, has been appointed Agent for that company, to succeed Mr. Pape.

—Mr. Christopher C. Baldwin, Naval Officer of the Port of New York, died at Newport, R. I., on May 12. Mr. Baldwin was President of the Louisville & Nashville Railroad from 1881 to 1884. In 1884 he was appointed a member of the New York Aqueduct Commission by Governor Cleveland. He was appointed Naval Officer of the Port of New York by President Cleveland in 1894.

Mr. A. L. Mohler, formerly General Manager of the Minneapolis & St. Louis, with headquarters at Minneapolis, Minn., has been appointed Vice-President of the Oregon Railroad & Navigation Co. Mr. Mohler was born in 1849, and entered railroad service, at the age of 19, with the Chicago & Northwestern as office clerk at Galt, Ill. From that time until 1882 he was connected successively with the Rockford, Rock Island & St. Louis and the Burlington, Cedar Rapids & Minnesota. On Oct. 9, 1882, he was appointed General Freight Agent of the St. Paul, Minneapolis & Manitoba (now the Great Northern); he afterward served in various capacities with this company, being appointed General Manager on Oct. 10, 1888. Mr. Mohler was appointed General Manager of the Minneapolis & St. Louis on July 21, 1894.

ELECTIONS AND APPOINTMENTS.

Chicago, Burlington & Quincy.—At the annual meeting of the stockholders held at Chicago on May 12, the present Board of Directors was re-elected. Hereafter, the annual meeting will be held on the first Wednesday of November, instead of the second Wednesday in May, as heretofore.

Coast Railway of Nova Scotia.—At the annual meeting held recently at Yarmouth, N. S., the present Board of Directors was re-elected, together with A. M. Hatfield, of Arcadia, and W. H. Jackson, of Philadelphia. Thomas Robertson was re-elected President, and J. H. Noblit, Treasurer.

Delaware & Bound Brook.—At the annual meeting of the stockholders of this company, a leased line of the Philadelphia & Reading, held at Trenton, N. J., on May 13, Edward C. Knight was re-elected President and J. S. Wise, Secretary and Treasurer.

Eastern Railroad Association.—The annual meeting of the association was held at New York on May 12, and the present officers were re-elected for the ensuing year. The following Executive Committee was elected: James Moore, Charles E. Pugh, Henry F. Kenney, John M. Toucey, Harvey Middleton, Richard H. Fowle and Robert J. Fisher.

Mexican Land, Navigation & Railway Co.—The first Board of Directors of this company, which has been recently organized in Mexico, is as follows: Santiago Mendez, H. P. Sturt, Pedro G. Mendez, Carlos Landa y Escandon and Lic. Emilio Velasco. Estanislao Velasco is Auditor of the company.

Mont Alto—At the annual meeting of stockholders of this road, which is operated by the Cumberland Valley, held at Chambersburg, Pa., on May 12, officers and directors were elected as follows: President, M. C. Kennedy; Secretary and Treasurer, E. B. Wiestling; Directors, M. C. Kennedy, Hastings Gehr, A. E. Price, Ezra Frick, S. B. Rinehart, A. H. Strickler and G. W. Smith.

Mount Washington.—At the stockholders' annual meeting held at Concord, N. H., May 12, the following officers were elected for the ensuing year: President, John H. Pearson; Treasurer, John F. Webster; Secretary, F. E. Brown; Directors, John H. Pearson, B. A. Kimball, T. A. McKinnon, J. W. Sanborn, John M. Mitchell, G. A. Fernald and N. White, Jr.

Muscogee, Oklahoma & Western.—The stockholders of this proposed railroad in Oklahoma and Indian Territories have elected the following officers and directors: President, P. J. Byrne; Secretary, B. W. Morphus; Treasurer, G. F. Sutton; Directors, P. J. Byrne, C. W. Turner, A. W. Robb, J. S. Stahler, G. W. Sutton and W. H. Herbert.

New York & Harlem.—At the annual meeting of the stockholders, held in New York City on May 18, the present Board of Directors was re-elected.

Norfolk & Western.—J. W. Campbell, formerly Trainmaster of the Scioto Valley Division, has been appointed Terminal Trainmaster at Columbus, O. D. H. Bargar has been appointed Trainmaster of the Scioto Valley and Kenova divisions, with headquarters at Kenova W. Va.

Ohio River—The annual meeting of the stockholders was held at Parkersburg, W. Va., May 13, and the following Board of Directors elected for the ensuing year: H. H. Rogers, C. M. Pratt, A. C. Bedford, S. W. Colton, Jr., Herman Oelrichs, New York City; George A. Burt, C. W. Harkness, Johnson N. Camden and B. D. Spillman, Parkersburg, W. Va.

Pennsylvania Co.—E. M. Bronson, formerly Assistant General Passenger Agent, with headquarters at Cincinnati, O., has been appointed Southern Passenger Agent. George E. Rockwell, formerly District Passenger Agent at Indianapolis, has been appointed Assistant General Passenger Agent, with headquarters at Cincinnati, to succeed Mr. Bronson. W. W. Richardson has been appointed District Passenger Agent, at Indianapolis, to succeed Mr. Rockwell.

Queen Anne's—At the annual meeting of stockholders held at Baltimore, Md., May 12, Directors were elected as follows: Wesley M. Oler, John S. Gittings, David Ambach, Jordan Stabler, Basil B. Gordon, John S. Gibbs, Charles H. Tilghman and Frank Ehlen, all of Baltimore, and James Ponder, Hiram R. Burton, L. L. Layton and Philip L. Cannon, of Delaware.

Ravenswood, Spencer & Glenville.—At the annual meeting, held May 13, at Parkersburg, W. Va., the following Directors were elected: Eli Ensign, Huntington, W. Va.; D. W. Chapman and G. P. Stone, Spencer, W. Va., and George A. Burt and H. P. Camden, Parkersburg, W. Va.

Ripley & Mill Creek Valley.—The annual meeting of the stockholders was held at Parkersburg, W. Va., May 13, and the following Directors elected: Eli Ensign, Huntington, W. Va.; J. H. Riley, Marietta, O.; Warren Miller, Jackson, W. Va.; George A. Burt and H. P. Camden, Parkersburg. The directors elected J. H. Riley, President; George A. Burt, Vice-President, and W. W. Trevor, Secretary.

St Louis, Chicago & St. Paul.—Directors of the reorganized company have been elected as follows: Charles E. Kimball, William H. Hale and George D. Mumford, all of New York City; Pierrepont Isham and Charles E. Braden, Chicago; Curtis Milliard and Ralph Blaisdell, Springfield, Ill.; B. F. Johnston, St. Elmo, and Joseph Dickson, St. Louis.

San Antonio & Aransas Pass.—George F. Lupton has been appointed Assistant General Passenger Agent, and J. C. Mangham Assistant General Freight Agent of the company.

Tennessee Northern.—At the annual meeting of stockholders held at Knoxville, Tenn., May 12, the following Directors were elected: Alfred A. Glasier, Edwin S. Webster, J. R. C. Peabody, W. F. Pope, all of Boston, Mass., and H. M. LaFollette, Samuel C. Baird, E. T. Warner and E. W. Rodgers, of Tennessee.

Texas & Pacific.—E. P. Turner, formerly City Passenger Agent at Dallas, Tex., has been appointed General Passenger and Freight Agent, with headquarters at Dallas, to succeed Gaston Meslier, resigned. The appointment took effect May 5.

Texas Midland.—At the annual meeting of stockholders, held at Terrell, Tex., May 11, the following officers were elected for the ensuing year: President, E. H. R. Green; First Vice-President, M. B. Loyd; Secretary, J. B. Tartt; Treasurer, Thomas E. Corley. Directors, M. B. Loyd, Joseph S. Lockwood, T. W. House, G. G. Williams, W. J. Quinlan, E. H. Green and E. H. R. Green.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Brainerd & Northern Minnesota.—An extension of this road is proposed from its present northern terminus

at Walker, Minn., on Leech Lake, north 15 or 20 miles. The road was built three years ago, and extends from Brainerd in a general northwesterly direction, 59 miles to Leech Lake, connecting with the Northern Pacific at the former place. The road is used principally for logging purposes.

Brooksville & Wellsburg.—This new road, which extends from Brooksville, the county seat of Bracken County, Ky., north 10 miles to a connection with the Chesapeake & Ohio at Wellsburg, has recently been opened to the public. The road follows the valley of Locust Creek, to avoid heavy cuts and fills. It was built for the shipment of agricultural products, especially tobacco, from Brooksville and vicinity, and it is expected an extension will ultimately be built south to Mt. Olivet, 12 miles from Brooksville. The company owns but one small locomotive. The officers are: President, Younger Alexander, Brooksville; Vice-President, J. W. R. Corlis; Secretary, James W. Staton; Treasurer, W. W. Fields.

Chicago & Calumet Terminal.—This road, operating in and around Chicago, is being double tracked between Blue Island and McCook, about 14 miles. This move was made necessary by the increased traffic brought by the Chicago, Hammond & Western, which now has trackage rights over this portion of the road. The improvements will include an interlocking system at Blue Island to provide for the crossings of the Chicago, Rock Island & Pacific with the Grand Trunk, and the Chicago, Rock Island & Pacific and Grand Trunk roads with the Chicago & Calumet Terminal. The extension of the Chicago, Hammond & Western from Lagrange to Franklin Park is reported to be progressing rapidly.

Depew & Southwestern.—This company has again made application to the New York State Railroad Commission for a charter to build a road from Depew, N. Y., 10 miles, to Blaisdell, a station on the Lake Shore & Michigan Southern, southwest of Buffalo. This company was formed in June, 1895, simultaneously with the Terminal Railway of Buffalo, and each company proposed to build a road between the points named. The two applications for a certificate authorizing construction were heard by the Board of Railroad Commissioners, who denied the application of the Depew & Southwestern, and granted that of the Terminal Railway of Buffalo. The former afterward appealed to the Appellate Court, which sustained the refusal. The Depew & Southwestern is backed by the Lehigh Valley and the Terminal Railway of Buffalo is a New York Central corporation. The connecting link between Depew and Blaisdell would facilitate the transfer of through freight at the western end of the state.

Galveston, Brazos & Southwestern.—This company has been incorporated in Texas, to build a railroad from Galveston, in a general southwesterly direction through Galveston, Brazoria and Matagorda counties, to a point in Jackson County. The capital stock is $100,000 and among the incorporators are A. J. Johnson, H. W. Crockett, L. P. Featherstone, H. J. Noble, E. S. Flint, R. J. Sledge and F. W. Pickett.

Gaylord & Ruby Valley.—Helena (Mont) newspapers report that this company has acquired the roadbed and right of way of the old Montana Southern, between Gaylord, Mont., and Twin Bridges. The Montana Southern was partly graded between those two points in 1893, and it is stated that it will only be necessary to complete the remaining seven miles of grading in to Twin Bridges, with some general repairing and widening work along the line, to make the roadbed ready for rails. The route lies along the Jefferson Valley, and the distance from Gaylord to Twin Bridges is 25 miles. After the road has been completed to Twin Bridges, it is proposed to extend it south to a point near the state line. The road will connect with the Northern Pacific at Gaylord, and it is generally understood that the latter company is behind the enterprise.

Jonesboro, Lake City & Eastern.—This company has recently been organized in Arkansas by local capitalists to build a railroad from Jonesboro east about 12 miles to Lake City, all in Craighead County. A party of surveyors is now in the field locating the line. It is expected that the road will be built this summer.

Kansas City, Pittsburgh & Gulf.—Track-laying was completed to Hornbeck, La., on May 12, making 653 miles of road completed from Kansas City. It is stated that the entire line to Port Arthur is ready for rails. Rails have also been laid between Port Arthur and Beaumont, Tex., 20 miles. All bridging on the line has been completed, excepting those over the Sabine and Natchez rivers, which are well under way. Track-laying is now being pushed from both ends of the gap that still remains between Beaumont and Hornbeck. On the Lake Charles section track-laying has been completed between De Quincy and Lake Charles.

Mexican Central.—It is reported that the proposed line from Jimenez, southwest to Parral, a distance of about 85 miles, is being re-surveyed.

Milwaukee & Superior.—The contract for extending this road from Sussex, Wis., west 10 miles to North Lake, has been let to Townsend & Co., and the work is to be completed by Aug. 1. The road now extends from Milwaukee in a general westerly direction 27 miles to Sussex.

Nashville & Knoxville.—Negotiations are being made for an extension of the road from its present terminus at Monterey, Tenn., east through Fentress County, to a connection with the Cincinnati, New Orleans & Texas Pacific. The company will build the extension provided Fentress County will give $50,000, in county bonds, in exchange for the same amount of bonds of the railroad. This proposition will probably be accepted. The road will open up the oil fields of Tennessee, and also make accessible some of the best block coal in the South. The coking coalfields lie further to the south, in Cumberland County, and these will be reached by the Tennessee Central Railroad, and possibly by connection with the Nashville & Knoxville.

New Mexico Railway & Coal Co.—This company has recently been incorporated in New Jersey, with a capital stock of $4,000,000, by John Davis and John Kelly, of New York City, and Edward Mowbray, of Brooklyn. The stated purpose of the company is to guild, equip, maintain and operate railroads and telebraph and telephone lines in New Mexico.

New Roads.—A. L. Strang, who is reported to be backed by New York capitalists, has submitted to the Board of Trade of Sedalia, Mo., a proposition to build a railroad from Sedalia north 53 miles to Miami, Saline County, passing through Marshall. The proposition provides that the citizens of Sedalia contribute $25,000, and those of Marshall and Miami $15,000 each, to be paid when the road is completed and ready for operation. Sedalia has accepted the proposition, and it is stated that surveys will be made at once.

Penobscot Central.—Location surveys for this proposed road in Maine are now being made, and Chief Engineer G. S. Vickery informs us that it is proposed to begin construction work some time during June. The road is to extend from Bangor northeast about 25 miles to Charleston.

Rio Grande, Cripple Creek & Northern.—This company has recently been incorporated in Colorado with a capital stock of $100,000 by Washinton Pavey, of Washington Court House, O.; Alexander L Shoults, of St. Louis, Mo.; William H. Murray, of Parkdale, and Henry L. White and Joseph H. Maupin, of Canon City. The company, like others recently formed, proposes to build a railroad to give an outlet to the Fresh Water mining district, which lies west of Cripple Creek, Col. The proposed line is from Parkdale, a station on the Denver & Rio Grande in Fremont County, through Fremont, Park and El Paso counties and the Fresh Water mining district to Cripple Creek. From Cripple Creek branch lines are proposed to Como and Black Mountain in Park County, Canon City in Fremont County and West Cliffe in Custer County.

Springfield, Harrison & Gulf.—This company has been recently organized in Arkansas to build a railroad from Springfield, Mo., due south to the Arkansas River at Dardanelle, Ark., from which point branches will be built one in a westerly direction along the Petit Jean Valley to Wister Junction, Indian Territory, and the other east, following the lower part of the Petit Jean Valley and thence into Little Rock, Ark. A bill is now before the Arkansas Legislature to provide that on the completion of this proposed road the company be granted 1,000 acres of land for each mile of railroad built. John A. Hinsey, Chicago, is interested.

Winnipeg, Duluth & Hudson Bay.—At a meeting of the Railway Committee at Ottawa, Ont., on May 11, the application for a charter to build this road was laid over until the next session, to enable the Government to look into the financial standing of the company. The road is proposed from a point in the southeastern part of Manitoba, on the Minnesota boundary line between the eastern limit of Township 13, east of the principal meridian and the Lake of the Woods, northwest to Winnipeg, north across Big Island and Black Island, in Winnipeg Lake, to deep water on Hudson Bay.

Winnipeg, Duluth & Manitoba.—A contract for building this road from Duluth, Minn., northwest direct to Winnipeg, Manitoba, has been agreed upon by the Manitoba Government, and Colonel James McNaught and others, representing a construction company, by which the former guarantees the payment of interest on the bonds of the road for a term of years, the railroad company guaranteeing low freight rates.

Electric Railroad Construction.

Albany, N. Y.—The Oneonta & Otego Valley Railroad Co. has been incorporated to build a surface road between the places mentioned in the title. The capital is $100,000, and the directors include Frank Gould, A. D. Getman, A. C. Lewis and Parker Wilson, of Oneonta.

Auburn, N. Y.—The consent of nearly all the property owners along the proposed route of the electric road to run from Auburn to Cayuga has been secured, but the franchise has not as yet been granted by the State Board of Railroad Commissioners. It appears that the New York Central is opposing the efforts of the company to build the electric road.

Baltimore, Md.—A contract for erecting poles, stringing wires and bonding the rails for the 13 miles of double-track road on the Falls Road Division of the Baltimore & Northern Railroad has been awarded to J. G. White & Co., of Baltimore, and the contract for building an addition to the present power-house has been awarded to John Cohen. The contract for building a car barn for 88 cars has been given to John Waters, and the Laclede Car Co., of St. Louis, Mo., has secured the contract for furnishing 15 closed and 25 open cars. The farther end of the line will connect at Pikesville with the Baltimore, Pikesville & Emory Grove Electric Railway, and a branch will run to Arlington to provide transportation facilities to Electric Park.

Bangor, Me.—Surveys are being made for the proposed electric road to connect Bangor with Glenburn, Kenduskeag, Corinth and Charleston. The road may be built this summer.

Bath, Me.—An electric road 4¼ miles long, to connect Phipsburg with Bath, is being surveyed.

Chagrin Falls, O.—It is announced that a company has recently sequred the right of way for an electric road from Chagrin Falls, to connect with the Cleveland Line between Burton and Chagrin Falls, and that the road will be built this summer.

Cincinnati, O.—The Consolidated Railway Co. proposes to extend its present line to Harrison through Prince Hill, making a total addition of 25 miles.

Cordoba, Mex.—A dispatch states that the first electric road in Mexico, running between Jalapa and Cordoba, a distance of about 70 miles, will soon be completed and placed in operation. The report further states that 2 000 men are now working on the construction of the line, which is owned by American capitalists.

Dayton, O.—Mr. Dennis Dwyer informs us that the Cincinnati & Miami Valley Traction Co., has been incorporated under the laws of the state of Ohio with a capital stock of $650,000, to build an electric road from Miamisburg, in Montgomery County, to Hamilton, in Butler County, O., a distance of about 27 miles. He states that the roadbed is nearly completed and the cars, built by the Barney & Smith Car Co., are finished. The power-house and its machinery is also nearly completed and the road will be ready for operation by the first of July. This road is a continuation of the Dayton Traction Company's road, now in operation from Dayton to Miamisburg.

Hackensack, N. J.—Samuel Taylor and David A. Pell have presented a petition from the Union Traction Co., asking for a franchise to enter Hackensack by the way of Greene street and also to build an electric road on some of the principal streets in the city.

Haddonfield, Pa.—The ordinance granting the franchise for an electric road in Haddonfield has passed its third reading. This ordinance has been before the Borough Commissioners for nearly four years, and it is thought that the road will soon be built.

Hartford, Conn.—The Hartford, Manchester & Rockville Tramway Co. have not accepted the requirements made by the town of Rockville, and until that is settled there will be no road built. If an agreement is reached the contract will probably be awarded to R. W. Hildreth & Co., of New York.

London, Ont.—The London Street Railway Co. proposes to build a line to Lucan, a distance of about 20 miles from London, permission having been granted at the last session of the Ontario Legislature.

Los Angeles, Cal.—The Los Angeles *Times* of May 5 states that by the end of May the Main street line will be entirely changed so as to be operated by electricity, and that new rails are being laid over the entire route.

Newark, N. J.—Connections have been made so that the consolidated Traction Co. is now running through cars from Newark to Paterson.

Newton, Mass.—The Needham & Newton Street Railroad has been completed and was opened for public service on May 11. The new line is a continuation of the Newton & Boston Street Railroad, which connects with the tracks of the latter road at the junction of Summer and High streets, Newton Upper Falls.

Ottawa, Ont.—The Ottawa Electric Railway Co. will place new rails on several streets. The estimated cost of the improvements is $4,000 per mile.

Philadelphia, Pa.—A bill was recently introduced into the City Council authorizing the Union Passenger Railway Co., which is a part of the Union Traction Co., to extend its tracks to the First, Second and Twenty-sixth wards on condition of the removal of unused tracks of certain other streets.

The Northwestern Railway Co., and the Mantua Avenue Passenger Railway Co., have applied for incorporation. Mr. Ira J. Williams is said to hold a large portion of the stock in both companies.

Pittsburgh, Pa.—Tracklaying for the Pittsburgh & Mt. Washington Street Railway was begun May 17 on Grandview avenue. Rails to lay 800 ft. have been distributed along the street on the hill, and this amount will be put down at once. The road is being built by Charles Jutte & Co.

Sandwich, Ont.—A franchise has been granted to a company to build an electric road in Sandwich, W., Ont.

Topeka, Kan.—A charter was granted on May 14 to the Southeast Kansas Railway Co. for the construction of an electric line from Baxter Springs to Galena, a distance of 10 miles. The headquarters of the company are to be located at Baxter Springs. Capital stock, $100 000. Directors: John M. Cooper and C. W. Daniels, of Baxter Springs; E B. Schermerhorn, W. E. Stice and others, of Galena, and J. H. Morgan, of Lowell.

Waynesburg, O.—The Stark Electric Railway Co. has been incorporated with a capital stock of about $100,000. The Secretary informs us that the single track line from Alliance to Canton will be built as soon as possible.

Westbrook, Me.—The Westbrook, Windham & Harrison Street Railway Co. has been organized under the charter granted by the last Legislature, with following Directors: Arthur W. Merrill, Wm. H. Bradley, of Portland; Chas. M. Waterhouse, R. D. Woodman, J. H. Tolman, C. B. Woodman and J. C. Scales, of Westbrook. The directors have elected the following officers: President, J. C. Scales; Vice-President, C. L. Woodman; Treasurer, C. M. Waterhouse; Clerk, J. H. Tolman. The capital stock is $300,000.

Wilmington, Del.—The Senate has passed the House bill to incorporate the South Side Electric Railway Co., in Wilmington, and also a bill to recharter the Newport, Newcastle & Wilmington Passenger Railway Co.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—Messrs. Patterson & Corwin, Accountants, have finished their investigation of the accounts of the Baltimore & Ohio, made in the interests of the Baltimore Reorganization Committee. The full report has not yet been given out, but the conclusions reached embody criticisms of the report of Stephen Little, which was made for the New York Reorganization Committee, and was discussed editorially in our issue of Dec. 11, 1896. Patterson & Corwin assert that the company was financially embarrassed on Sept. 30, 1888, the commencement of the period under discussion, in that it had a floating debt of over $4,000,000; that the condition of the road has not yet been revealed and that the receivers are able to keep its business going under the protection of the courts only by the unwarrantable issue of receivers' certificates. These certificates now amount to about $10,000,000.

Boston & Maine.—The earnings for the three months ending March 31 have been reported as follows:

	1897.	1896.	Inc. or Dec.
Gross earn	$4,238,775	$4,419,393	D. $180,618
Oper. expen	2,972,780	3,270,134	D. 296,354
Net earn	$1,264,995	$1,149,259	I. $115,736
Other income	113,942	.....	I. 113,942
Total income	$1,378,937	$1,149,259	I. $229,678
Fixed charges	1,338,124	1,300,275	I. 37,849
Surplus	$40,813	(Def.) $151,016	I. $191,829

Carolina, Tennessee & Ohio.—This road was sold under foreclosure at Southport, N. C., May 15, under a decree issued by Judge McIver, of the State Superior Court at Wilmington, N. C., to John R. Turrentine, Jr., of Wilmington, for $10,000. It is expected that the company will be reorganized and work resumed on the road within a short time. The road, which is proposed to connect Wilmington with Southport, about 30 miles, was partly completed last year by the Union Construction Co.

Chicago & Northern Pacific.—On May 12 Judge Jenkins, of the United States Circuit Court, issued an order confirming the sale of this road to the reorganization committee, of which J. Edward Simmons, of New York City, is Chairman. The sale was made on Nov. 17, 1896, the bid being $8,000,000.

Chicago, Milwaukee & St. Paul.—Arrangements have been made to refund the Prairie du Chien Division 8 per cent. bonds, which will mature on Feb. 1, 1898. In exchange for these bonds it is proposed to issue general mortgage 4 per cent. gold bonds of the company at par. For each Prairie du Chien Division 8 per cent. $1,000 bond, the holder will receive one general mortgage 4 per cent. gold bond to mature May 1, 1989, and bearing interest from July 1, 1897, and $56.13 in cash, the amount of the accrued and accruing interest on the first men-

tioned bond from Feb. 1, 1897, to Feb. 1, 1898. The total amount of the 8 per cent. bonds outstanding is $3,674,000.

Delaware.—The lease of this road to the Philadelphia, Wilmington & Baltimore was renewed on May 13, the original lease, which was made in 1889, having expired. By the terms of the new lease, which is to run 30 years, the stockholders of the lessor company are to receive all net earnings, and are to pay interest and dividends. The main line of the road extends from Shellpot Crossing, Del., to Delmar, on the Maryland state line, 95 miles, with branches aggregating 22 miles.

Duluth & Winnipeg.—The terminals of this company at Superior, Wis., and the ore docks on Allouez Bay were sold under foreclosure at Superior, on May 15, by Commissioner Henry S. Butler. The property was bid in by Edward J. Manay, of New York, who represented a committee of the bondholders, for $475,629. The sale was made under a mortgage of $159,000, given in 1892 to the Safe Deposit & Trust Co., of Maryland.

Illinois Central.—The company has arranged with Kuhn, Loeb & Co. and Vermilye & Co., of New York City, for the refunding of issues of bonds of its subsidiary lines. Thirty millions of 3½ per cent. gold bonds will be issued, $20,000,000 being to take up Chesapeake, Ohio & Southwestern purchase-money mortgage bonds, issued when the Illinois Central bought that property (of which it took possession Aug. 1, 1896); and $10,000,000 to take up first mortgage bonds of 1896 issued on the St. Louis Division, comprising the old St. Louis, Alton & Terre Haute. The former will be dated July 1, 1897, and mature July 1, 1953, interest payable semi-annually in January and July. The mortgage will cover all property of the former Chesapeake, Ohio & Southwestern, extending from Elizabethtown, Ky., via Paducah, to Memphis, Tenn., 353 miles; the lease of the line of the Louisville & Nashville, between Louisville and Cecilia Junction, 46 miles; the Ownesboro, Falls of Rough & Green River Railroad, from Owensboro to Horse Branch, Ky., 42 miles, purchased April 9, 1897; the former Short Route Railway Transfer Co., operating 1½ miles of road in Louisville, Ky. (referred to in our issue of Feb. 19 last); the terminal properties in Louisville and Memphis heretofore deeded in trust to the United States Trust Co., and certain recent purchases of lands in Louisville and elsewhere. The mortgage provides for an issue of $5,000,000 of additional bonds. The interest charges on the $20,000,000 will be $700,000. No allowance has been made for taxes. Of the $10,000,000 of St. Louis division bonds, $6,500,000 will be used to retire $2,275,000 St. Louis, Alton & Terre Haute terminal bonds, subject to call at 105 on one year's notice; $998,000, Belleville & Southern Illinois (leased) first mortgage 4½ per cent. bonds, due Oct. 1, 1897; $550,000, St. Louis Southern (leased) first mortgage 4 per cent. bonds, due Sept. 1, 1931; $250,000, Carbondale & Shawneetown (leased to St. Louis Southern) first mortgage 4 per cent. bonds, due March 1, 1932; $220,000, Belleville & Eldorado, first mortgage 7 per cent. bonds, due July 1, 1910; $485,000, Belleville & Carondelet (leased) first mortgage 6 per cent. bonds, due June 1, 1923, and $1,000,000 Chicago, St. Louis & Paducah first mortgage bonds, subject to call at any time on 60 days notice at 105, a total of $5,778,000. The balance, $3,500,000, will be used to acquire interests and outstanding securities in the properties mentioned and to build extensions or branches or purchase additional equipment for those properties. Five million dollars of additional bonds are authorized to be set aside for exchange for the stocks of the old St. Louis, Alton & Terre Haute and Belleville & Southern Illinois railroads, deposited with the United States Trust Co. These bonds will bear 3 per cent. interest and until July 1, 1898, are subject to the option of Spencer Trask & Co. to purchase them at 90. While the contract calls for the sale of the $30,000,000 of bonds as stated, only part of each issue, aggregating about $6,000,000, will be delivered at once. The company has also sold to the same houses the $1,350,000 Chicago, St. Louis & New Orleans first mortgage bonds, interest reduced to 3½ per cent., to be issued November 1 in lieu of maturing divisional bonds, and has arranged with these firms to renew at 3½ per cent. the $2,000,000 Springfield division bonds maturing next January.

Michigan Central.—The earning for the year ended Dec. 31, 1896, have been reported as follows:

	1896.	1895.	Inc. or Dec.
Gross earn.....	$13,821,614	$13,651,420	I. $170,194
Oper. expen.....	10,392,350	10,183,231	I. 209,119
Net earn.....	$3,429,264	$3,468,189	D. $38,925
Int. & rentals.....	2,394,565	2,402,201	D. 7,636
Surplus.....	$1,034,699	$1,065,988	D. $31,289
Can. So. prop.....	296,474	304,715	D. 8,241
Net revenue.....	$738,225	$761,273	D. $23,048
Other income.....	$39,685	$49,077	D. 9,392
Net income.....	$777,910	$810,350	D. $32,440
Div. (4 p. c.).....	749,520	749,520	.....
Balance.....	$28,390	$60,830	D. $32,440

The net revenue was equal to 4.15 per cent. on the capital stock, against 4.32 per cent. in 1895. The construction account has increased $111,718, representing the cost of building the Twin Lakes Branch, from Gravling to Lewiston, 28 miles, which was 113,818, less $2,100 received from sales of land.

New York & Harlem.—At the annual meeting of the stockholders held in New York City on May 18, the proposed issue of $12,000,000 of 3½ per cent. gold bonds, to be redeemable May 1, year 2,000 was approved. The issue of these bonds was proposed under the New York Central & Hudson River refunding plan to take up the $12,000,000 of outstanding seven per cent. bonds which come due in 1900.

New York, New Haven & Hartford.—The operations of the company for the three months and nine months ended March 31 were:

	1897.	1896	Inc. or Dec.
Three months:			
Gross earn.....	$6,433,176	$6,606,955	D. $173 779
Oper. expen.....	4 541,316	4,488,863	I. 52,453
Net earn.....	$1,891,860	$2,118 092	D. $226,732
Other income.....	129.150	124,023	D. 5,127
Total net.....	$2,021,010	$2,242,115	D. $221,105
Charges.....	1,609,926	1,498,207	I. $111,719
Balance.....	$411,084	$743,908	D. $332,824
Nine months:			
Gross earn.....	$21,710.785	$22,736,643	D. $1,025,858
Oper. expen.....	14,595,380	15,532,349	D. 936,969
Net earn.....	$7,115,405	$7,204,294	D. $88,889
Other income.....	424 673	358,555	I. 71 818
Total net.....	$7 545,078	$7,562,349	D. $17,771
Charges.....	4,753,268	4,917,418	D. 164,150
Balance.....	$2,791,810	$2,615,431	I. $116,379

Oregon Short Line.—At a recent meeting of the directors, it was voted to authorize an issue of $15,000,000 non-cumulative income bonds, series B, provided for in the plan of reorganization. The company's capital stock is $60,000,000. Its bonded indebtedness will now be $36,500,000 first mortgage bonds, $7,000,000 A income bonds, and $15,000,000 B income bonds.

St. Louis, Chicago & St. Paul.—This company has been reorganized and new articles of incorporation were filed at Springfield, Ill., on May 14. The capital stock will be $1,500,000, and the principal office at Springfield. The road was sold at Springfield, on April 3, under foreclosure and was bought in for $650,000 by Thomas Carmichael, representing English security holders. The names of the first Board of Directors are given in another column.

Tennessee Central.—At a Special Term of the Chancery Court, held at Crossville, Tenn., May 10, Judge Smith issued a final decree, ordering the road sold under foreclosure at an upset price of $125,000. Henry G. Dunbar, Clerk and Master, was appointed Special Commissioner to conduct the sale, which will be held at Crossville June 24. The terms of the sale are six months' credit, an interest-bearing note being acceptable, for which a lien will be retained upon the property sold to secure its payment. All bidders are required to deposit 10 per cent. of the upset price. A special term of the court has been set for June 24 to confirm the sale. The bonded indebtedness of the road consists of $302 500 first mortgage 5 per cent. gold bonds, of which $208,000 were used as collateral security, $2,000 sold outright and $92,000 issued to the Tennessee Improvement Co. for construction work. Of the last named amount the improvement company used $53,000 as collateral security. Receivers' certificates to the amount of $94,282.99 were issued, and the total indebtedness of the railroad and improvement company is, approximately, $595,152.75. The road was described in our issue of Feb. 5. The date of sale was originally set for April 5.

Electric Railroad News.

Chicago, Ill.—John C. McKeon, Receiver of the Calumet Electric Street Railway Co., has filed a petition in the Federal Court for permission to borrow money for the operation of the Calumet road, which controls 90 miles of electric lines in and near Chicago. He states that $185,000 is needed for immediate use.

Gallipolis, O.—Mr. M. S. Connors, Superintendent of the Columbus, Hocking Valley & Toledo, has been elected General Manager of the Gallipolis & Point Pleasant Street Railway Co., and Mr. F. B. Sheldon, Chief Engineer of the same steam road, has been elected to a similar position on the street railroad. About two years ago the steam railroad secured control of the street railroad and since that time improvements and extensions have been made.

Indianapolis, Ind.—The following are the newly elected directors of the Citizens' Street Railway Co.: W. W. Kurtz, Kennedy Crossman, R. H. Rashton, W. C. Huston, Joseph S. Neff, F. Dundore and W. J. Turner, the latter being the only member of the old directory chosen. Following the selection of the directors, Mr. K. Crossman was elected President. The General Superintendent, Treasurer and Electrician were re-elected.

Ithaca, N. Y.—The Cornell University has purchased $70,000 of bonds of the Ithaca Street Railway Co., formerly held by Judge Alfred Hand.

Newton, Mass.—The Commonwealth Avenue Street Railway Co. has petitioned the Railroad Commissioners for authority to increrse its capital stock from $65,000 to $175,000.

Philadelphia.—The stockholders of the East Penn Traction Co. have decided to increase the capital stock from $350,000 to $416,000, and to issue bonds to the full amount of the stock. The company is now operating a road in Bucks County, which will be extended in a short time.

Rochester, N. Y.—At the annual meeting of the Board of Directors of the Rochester Street Railway Co. President John N. Beckley resigned, and Frederick Cook, ex-Secretary of the state of New York, was elected to fill his place.

Saginaw, Mich.—The Union Street Railway Co. has given a chattel mortgage to the Union Trust Co., of Detroit, covering the combined real and personal property of the company and securing the indebtedness, aggregating $42,000.

TRAFFIC.

Traffic Notes.

The Baltimore & Ohio will run observation parlor cars on the rear end of its best express trains during the coming summer between Pittsburgh and Washington, and between Wheeling and Washington.

The Texas & Pacific, the St. Louis, Iron Mountain & Southern and the Nashville, Chattanooga & St. Louis have put on a through sleeping car between Fort Worth and Nashville. The Pennsylvania Railroad and the Southern Railway now run a sleeping car through between Jersey City and Nashville.

A San Francisco paper states that a considerable portion of the freight for that city coming from Asia is now received through Tacoma, the steamship lines landing at that city proving active competitors of the old lines which run to San Francisco. The steamer Pelican recently brought 500 tons of San Francisco freight to Tacoma, and another, a few days later, 1,400 tons.

The Philadelphia Board of Trade has sent to Congress a memorial in favor of a law permitting pooling of railroad earnings, but it contains no specific recommendation of any of the bills now before Congress. The Board asks for careful consideration of the best features of all or any bills, so that a law may be passed which shall thoroughly protect the rights of the shippers while carefully guarding the welfare of the railroads.

The St. Louis Traffic Bureau, which has recently engaged an expensive commissioner, already claims to have made a master stroke, the same being nothing less than the abrogation by the railroads of the charge of $2 a car, heretofore made on all bulk freight which had to be transferred after arrival. Grain dealers having cars on team tracks and desiring, a day or two later, to have them sent to an elevator had to pay this charge, and of course were averse to doing so. They have, according to the St. Louis papers, been able all along to secure rebates, more or less regularly, and now, it appears, have succeeded in making this irregular practice so nearly universal that the railroads have agreed to formally abolish the charge.

The meeting of the Board of Control of the Joint Traffic Association on May 13 appears to have been devoted chiefly to consideration of complaints that the Baltimore & Ohio has secured too large a share of competitive freight. No official statement is given out, but the reporters gather that on westbound through freight from New York, the Baltimore & Ohio has doubled its tonnage as compared with last year. The discussion developed charges that "two of the strongest roads" had also been increasing their westbound shipments, and finally the presidents of the New York Central, the Pennsylvania and the Baltimore & Ohio were constituted a committee to investigate the alleged irregularities.

The managers of the Joint Traffic Association have abrogated all joint tariffs between New York and New Orleans, leaving each road to act independently. This appears to be due to sharp competition of the Morgan Line steamships. Very little New Orleans freight is subject to the Joint Traffic Association, but it is said that the Chesapeake & Ohio and the Norfolk & Western have made radical reductions to New Orleans to meet the steamship rates. This week it is reported that the Pennsylvania is bringing lake and rail grain from Chicago to the Atlantic seaboard at 2½ cents below the published rate.

Commissioners' Rates in North Dakota.

The Railroad Commissioners of North Dakota, in accordance with the law recently passed by the Legislature, have issued tariffs for the transportation of freight and passengers over all of the railroads of the state. They prescribe a rate of three cents a mile for passengers on all lines, which is about one cent less than the rates now prevailing. On general merchandise they have adopted the mileage rates now in force in Minnesota, which are said to be about 10 per cent. less than those now charged in North Dakota. The reduction ordered in grain rates equals about 8 per cent. All the foregoing rates are ordered to go into effect July 1. On coal the Commissioners direct that the new rates be adopted at once. They are, per ton: 25 miles, 50 cents; 50 miles, 75 cents; 100 miles, 98 cents; 150 miles, $1.18; 200 miles, $1.38.

Chicago Traffic Matters.

CHICAGO, May 19, 1897.

The Interstate Commerce Commission is to begin a hearing in this city on June 1 to take up the Eau Claire lumber rate snarl; also the complaint of the Board of Trade as to grain rates eastward and the complaint of the Chicago Live Stock Exchange concerning the switching charge of $2 a car. The Eau Claire case [discussed in the *Railroad Gazette* of March 12 last] is an exceedingly knotty one, and it is understood the Commission will reopen the whole question.

The Western general passenger agents will put in the following open intermediate rates to the Missouri River and Colorado common points in order to avoid disturbance of the low excursion rates for the Christian Endeavor Convention at San Francisco. From Chicago to Colorado points the rate authorized will be $12.50, and $9 from the Missouri River to Colorado. From Colorado common points to Chicago, eastbound, $15, and $10 to the Missouri. From Chicago to Missouri River points a rate of $7 50 is made, the rate eastbound between the same points being $9. Corresponding reductions will be made in the fares between all the points named and St. Louis. Tickets are to be sold westbound on the dates of sale of the Christian Endeavor excursion tickets, but eastbound they will be sold daily up to about August 15. The regular Denver rate from Chicago is $29.50 and $17 from the Missouri to Colorado points and $12.50 from Chicago to the river, so the reductions made for the summer, beginning June 29, are very marked.

The Western roads are already considering an entirely new freight agreement, and they expect to adopt it on June 1, replacing the present Western Joint Traffic Bureau. The new organization is to be known as the Western Freight Traffic Association. The agreement was submitted to the general attorneys, who made several changes in it, the most important of which was the striking out of that part giving the Commissioners power to adjust differentials. The preamble reads:

To aid in fulfilling the purposes of the interstate commerce act, and all other statutes relating to or affecting the traffic hereinafter described, to co-operate with each other and adjacent transportation lines or associations in the enforcement of reasonable and just rules and regulations of each of the parties hereto affecting state and interstate traffic, to prevent illegal practices and unjust discrimination, and for the purposes of economy in the printing and distribution of tariffs, rules and regulations; also for the purpose of providing traffic statistics. . . .

Lake rates on package freight have lately suffered a good deal of demoralization, the New York Central, Lehigh Valley, Lackawanna and Anchor lines of boats taking part in the scramble. Business is extremely dull, and all the lines named have done some wholesale slashing of rates. In order to try to fix the odium of this rate-cutting on a scapegoat, charges and counter charges are being made that the Baltimore & Ohio's new line of boats is accountable for the trouble, but most people believe that the cutting is confined to the lines first named.

A committee of representatives of the trans-continental lines, the Central Freight Association and the Trunk Lines has been in session in this city trying to reach an agreement by which competition of the Gulf, Suez and Panama routes may be met. It was finally decided to allow the trans-continental lines to publish commodity rates from Pacific coast terminal points to the Eastern seaboard, minimum to be 75 cents per 100 lbs.

Eastbound all-rail shipments from Chicago and Chicago Junctions to pcints at and beyond the Western termini of the trunk lines for the week ending May 13 amounted to 48,420 tons, as compared with 62,365 tons the preceding week. This statement includes 14,447 tons of grain, 3,541 tons of flour and 13,753 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	WEEK ENDING MAY 13.		WEEK ENDING MAY 6.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio.....	3,427	7 1	3,683	5.9
C., C., C. & St. Louis.....	2,987	6 2	2,132	3.4
Erie.....	5,384	11.1	9,203	14 8
Grand Trunk.....	3,674	7 6	3,456	5.5
L. S. & M. S.....	6,171	12.7	7,347	11 8
Michigan Central.....	8,478	17 5	10,447	16 7
N. Y., Chi. & St. L.....	4,733	9.8	6,776	10 9
Pitts., Cin., Chi. & St. Louis.	3,821	7.9	7,545	12 1
Pitts., Ft. Wayne & Chicago	6,374	13.2	7,428	11 9
Wabash.....	3,371	6.9	4,348	7.0
Totals.....	48,420	100 0	62,365	100.0

Lake shipments last week were 87,002 tons.